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# GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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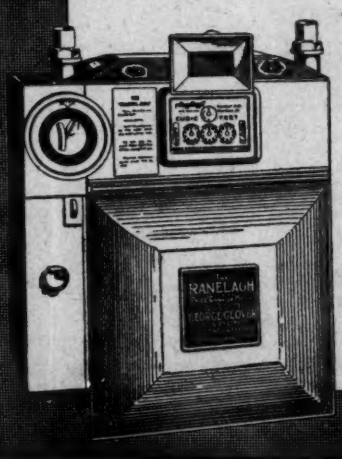


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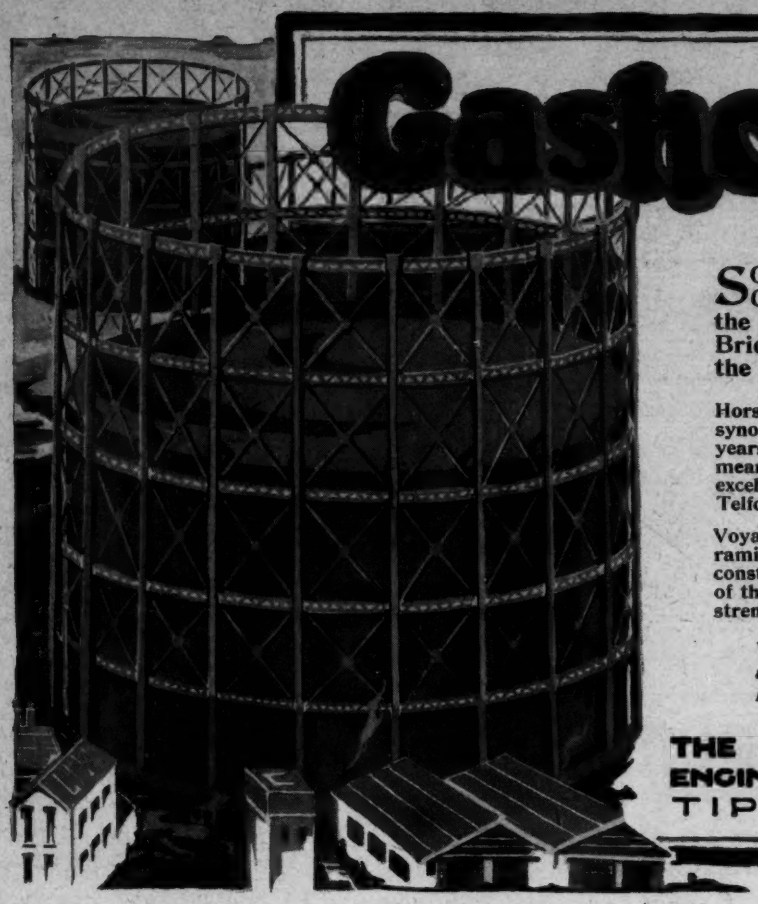

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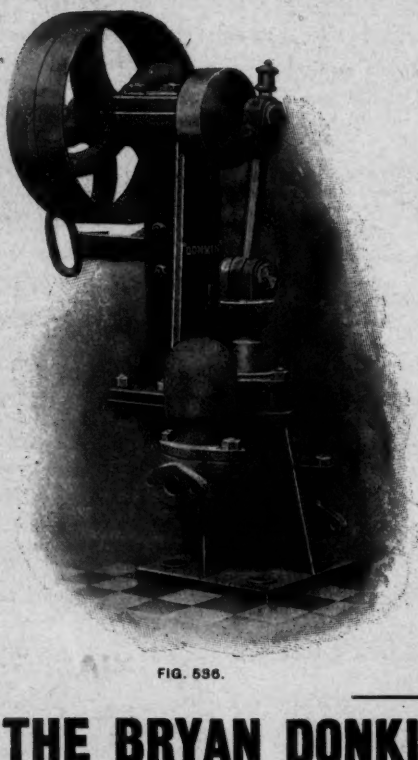

FIG. 536.

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VOL. CLXVIII., No. 3215.] WEDNESDAY, DECEMBER 24, 1924. [76TH YEAR.


The Heartiest Christmas Greetings to All.

## EDITORIAL NOTES.

### Mutual Assistance on a Business Footing.

IT has often occurred to us that it is a great pity the considerable facilities and resources possessed by the larger gas undertakings cannot—perhaps we should say have not—been participated in, on a business footing, by neighbouring concerns less fortunately circumstanced. For example, some time ago there was much talk, succeeded by little action, of greater protection being given to gas undertakings in respect of, in the purchase of coal, the quantity of impurity and inert matter which was being sold to them at the price of good coal, which impurity detrimentally affects efficiency and the quality and quantity of the products derived per ton of material handled. This means uneconomy which is opposed to the interests of both undertaking and consumers. Then there is the question of research. A large undertaking can maintain highly equipped laboratories and a skilled staff, while smaller undertakings have to be content with something of a much lower order, with proportionately smaller results. In some cases, too, large undertakings have exceptionally fine facilities for handling coal and other materials, which are denied to their less favourably conditioned neighbours. They are also in a position economically to provide means for producing gas which could be supplied in bulk to neighbours at a cost which on occasion would be mutually advantageous. At Newcastle-upon-Tyne the South Metropolitan Gas Company have a coal purchasing and testing organization of which greater use could be made; they have a fleet of steamers for coal conveyance; they have a scientific research department second to none in the industrial systems of the country; they have on the river at East Greenwich landing stages and equipment which can economically deal with incoming and outgoing materials; and they have extensive plants for carbonizing coal, and for dealing with secondary products. The greater the use of such organizations and facilities, or the greater the co-operation in meeting their costs through the spreading of service or the results of their service, the more economy and efficiency are promoted and potentiality developed into actuality. In such greater economy and efficiency, and development of power, it is to the public interest that those gas undertakings which are within geographical range of their influences should participate. Hence a Bill which the South Metropolitan Gas Company are promoting in the coming session of Parliament. The notice of this was referred to in our editorial columns last week; the actual provisions of the measure are indicated in summarized form in later columns. The Bill is founded on co-operation and amalgamation; and the intentions are obviously so much to the public benefit that no one who favours progress can possibly oppose it. The financial provisions and the proposals as to representation on the Board of the principal Company not only denote the promotion of mutual assistance, but the promotion of mutual interests, with very definite and substantial ties. There is a scheme here (for details of which we refer readers to the later article indicating the scope of the Bill) which is novel and progressive; and maybe it is the germ of larger developments which at the moment even the best of visions cannot foresee. We congratulate the Company on what we regard as a practical and potent lead in a new direction.

### A Jubilee and a Coming of Age at Leeds.

LAST week was a great one at the Leeds University. The scientific and scholastic world were there in representative force; institutions concerned in industries with which the work of the University is identified had delegates there; former members of the staff and old students were present—all joining in congratulations to the University, rejoicing over its achievements, and wishing it progress in its beneficent operations and realization of its new ambitions. The occasion was the celebration of the jubilee of the Yorkshire College of Science, which was the nucleus of the University, and the coming of age of the latter. The intimate association of the gas industry with the University, through the Coal Gas and Fuel Department—through the educational and research work conducted therein—has promoted live interest on the part of gas men in its affairs. In their minds it now stands as a prominent factor in their technical work and progressive successes. The industry has much for which to thank Leeds. Though Prof. Arthur Smithells no longer has active part in the work there, the industry acknowledges its indebtedness to him for the share he took in making the relationship of the industry with the University something real, tangible, and practical. And the work of Prof. J. W. Cobb and his staff of earnest collaborators has created for the industry fresh components in its fundamental knowledge, and has given us men with qualifications and of character who represent the infusion of new blood into the veins of the industry. Thus it is that, on such an occasion as this jubilee and coming of age, the industry—though only present through its representatives—can rejoice with full heartiness with the University on the place it has built for itself through, particularly, the cultivation of the application of science to industrial pursuits, and can sincerely wish for it a prosperity in future transcending its past accomplishments and triumphs.

The speech-making at the celebrations was as rich in matter as it was eloquent in phrase; and this was true from the inaugural addresses of the Chancellor (the Duke of Devonshire) and of the Vice-Chancellor (Dr. J. B. Baillie) throughout. From the reading of them, as must have been the case from the hearing of them, much interest is gathered. The records of the University and of its forerunner, the College of Science, tell of the brave struggle made from their inception onwards. In the early days, and even when the University was founded, appreciation of the need of science in industrial operations was not of the order that it is to-day, and that of to-day is, it is safe to say, at a lower level than it will be in the future. There is an evolution of thought and application going on in this direction—slowly, but surely. What the public spirit, the practical judgment, the courage, and lofty enthusiasm for human enlightenment—of which the Vice-Chancellor spoke as attributes of the men who have developed

this great seat of learning—accomplished in times less encouraging than the present, can in our belief achieve still more in the future. There is much room and much need for it. The University is proud of those who laid its foundations so truly and well, and who builded in manner that gives permanent strength. The College and the University have also contributed to science many of its distinguished lights. One of the many men of whom we are proud in the gas industry is Sir Dugald Clerk. He was present at the celebrations last week; but it is half-a-century ago that he was assistant at the Yorkshire College of Science to those conspicuous chemists—Sir Edward Thorpe and Sir Arthur Rücker. The College then prided itself upon a staff of six; the University now has fifty professors, and a total staff of 300. These figures are significant. In themselves they tell a story of a remarkable change in view and requirement; and yet those who govern the affairs of the University to-day are hoping—"Progress" being their motto and aim—to have the means placed at their disposal whereby they may provide more accommodation and may enlarge the spheres of their activities. And this because (to use the words of the Duke of Devonshire) they are convinced that they can rise to an even greater measure of utility and advantage not only to the students, but to the community as a whole.

This we can all admit to be true, if we accept, as we must do, the elementary truth advanced by the Earl of Balfour, at the dinner, that of all instruments now in existence for the material betterment of mankind, science and its applications are incomparably the greatest. With all our boasted philosophy in the past, it took the world a long time to grasp this; and yet, as a backward glance is made to the days when the wise men who made research laid bare fundamental facts, we see how even their work enabled progress to be effected in industry and in the conveniences of mankind. We are only doing now what they did then; only it is being done to-day much more systematically, and with greater intensity through the accretion of knowledge, and in every quarter. The appreciation of the value of the application of science to the service of man had its small beginning the same as all else; it is not a modern product; it has had its large growth; and still there is infinite room for exploration and application. The growth will be—must be—never-ending. There was, as always, a great deal of wisdom in what the Earl of Balfour said on this occasion. He has the power of opening one's eyes to truths that in the day's rush one is liable to pass unnoticed. He points out (in other words) that those engaged in industry look to their reward in wealth. They apply science to enable them to produce with greater economy and efficiency, which to them is a material benefit. But they, generally speaking, overlook the fact that they cannot have applied science without pure science; and they have little or no thought for those who work in the (from the personal wealth point of view) unprofitable realms of pure science. Their reward lies largely in the joy of augmenting knowledge in itself. It is true that those who have applied science have done immense good to their fellow creatures. On them depends the very existence of a community like ours. But in many cases their reward has been not inadequate to the material gains which they have given to their fellow citizens; yet he who is fundamental to it all—he who pursues pure science for itself—is not frequently a richly rewarded member of the community. It is a poor reflection that they often have to be content with the admiration of their fellows and the gratitude of posterity. The important place occupied by pure science must never be neglected, must never be pushed aside. This is a danger in these utilitarian times. Again, specialization in knowledge and its application is, of course, inevitable; for it is knowledge special to a particular industry that is required. Notwithstanding, the fact must always be borne in mind that we shall never get an improving technique or developing industries unless behind them there is pure science. Therefore, with our technical educational work there must be maintained that "far loftier, far more important, and far more useful foundation which pure science, and only pure science, can give." Consideration of these matters, fascinating, important, and "far-reaching" as they are, must be left here.

The whole week's celebrations at Leeds were befitting a University that has grown great in its services and that desires to grow still greater. If for the University all the good wishes expressed and felt last week materialize (we hope they will), then that seat of learning—world-famed and with the men it has sent forth applying their knowledge in all quarters of the globe—will become still more famed and will be of still larger service to the industries upon which mankind depends.

## Fittings Inspection Raised in Parliament.

THE question of the inspection by gas undertakings of gas piping and fittings in the houses of domestic consumers has been raised in Parliament. This indicates that the matter is being pushed from outside the respective provinces of the Board of Trade and the gas industry. The Board do not require any inducement to action in this matter; and there was no need to attempt to hurry the exploration which is being made on behalf of the gas industry to comply with the recommendations in Mr. Butterfield's report as to submitting suggestions for a system of periodical inspection, and of maintenance in safe condition, of gas piping, fittings, and appliances in dwelling-houses, and the elimination from the trade of types and qualities of fittings which are liable, after a few years' use, to become unsound or unsafe, and of flueless heaters and other appliances which are apt to evolve carbon monoxide. The questions involved are complex and far-reaching; and it would be impossible for any Committee—specialists in gas matters though the members of the Committee are who have been appointed by the National Gas Council to investigate and report before presenting a scheme—to deal summarily with such a large question.

The vision of those outside the industry who are interesting themselves in this matter is—according to a question put by Sir Clement Kinloch Cooke—that legislation should be introduced for the purpose of securing such inspection and elimination. The President of the Board of Trade (Sir P. Cunliffe-Lister), however, at once made it clear that they do not at present contemplate legislation on the subject, though fully aware of its importance. Those who think the matter is one for immediate legislation do not appreciate what it means. There may be compulsion on gas undertakings to inspect, but the "renovation" of consumers' fittings raises the question as to who should pay for the work. The suppliers of gas cannot be expected to bear the cost of keeping in repair piping and fittings which are not their property, although they inspect and regulate the appliances free. Furthermore, if appliances that are unsound and unsuitable are to be prohibited, power will have to be given to gas undertakings to refuse to supply premises on which they are found, until they have been replaced or put into satisfactory order. This would be the only way of stopping ironmongers from dealing in the cheap, flimsy, and inefficient continental productions which are sold direct to consumers, and put into use without the knowledge of the undertakings. It is a very big question, when one begins to talk of legislation and compulsion. Nevertheless, the Board of Trade are hopeful Sir Philip states that they are taking steps which they hope will result in the active co-operation of the gas industry and the makers of appliances in securing the objects indicated. Of course, it is not the British makers who are the chief offenders in this matter; they are to be found across the North Sea, and some of the ironmongers this side are their allies. This point should be borne in mind in connection with a reply the President gave to the question by Mr. Reginald Clarry: "Is it not a fact that the undertakers "will look after this matter in their own interests?" The answer was: "I should like to stimulate both parties"—apparently meaning the gas suppliers and the makers of appliances. However, the Board are hoping to be able to take action "shortly," as the preliminaries are going on very "satisfactorily."

## The Industrial Circle.

THE "B.C.G.A." do a large amount of important work in an unobtrusive manner. So much so is this the case, that sometimes the results of their quietly conducted operations come as a surprise. Last week we published a report of a meeting which announced an uncontemplated and therefore unexpected development in the Salesmen's Circle movement. That was the formation of a Circle for salesmen specializing in industrial work. We are not sure that the inclusion of the word "salesmen" in the title of the new Circle is altogether good. It rather denotes a limitation in eligibility for membership; and there may be men who would be of considerable use to the Circle who are not officially designated "salesmen," but whose technical know-

ledge of the industrial applications of gas is of an invaluable order. Such men ought not to be shut out by a mere matter of title; they ought to be pressed to come in. This, however, by the way. There may be some who will question the need for the new Circle. We think the report of the proceedings at the inaugural meeting published last week, and the short article we reprint from the "B.C.G.A. Bulletin," written by the Executive Chairman (Mr. F. W. Goodenough), are proof positive that there is special work for such a Circle to perform. The Circle to us is additional evidence of the dearth of organization and means of intercommunication and acquisition of knowledge that obtained prior to three years ago on the gas-trading side of the industry. It is extraordinary how slow the industry was to appreciate that one of the dominant claims—if not the predominant claim—of their business was to have the fighting force on the front adequately organized, trained, equipped, and with the means of procuring intelligence as complete as at any part between the front and the base of operations. Then there was more consideration for the base than the front. It is from the sales front that expansion of business and territory is gained, and the successes there are largely due to qualification; and qualification is built-up from information sought or received. The business of developing the industrial applications of gas is not the same thing as the purely domestic business. Greater specialization is needed; technical knowledge is a power in connection with it; discernment and discrimination are required in peculiar manner; the gift of getting to the heart of a new problem and of developing a solution is essential. When we read the statement of the Executive Chairman—that there are nearly 400 separate ways in which gas can be utilized in industrial heat processes in nearly 4000 separate trades—the new Circle, it is plain, will not lack operating scope.

On all grounds, therefore, we welcome the new organization. With such a vast field before it, it can readily be seen that it will be highly beneficial to those who will be its members, and not only to them but to the industry and to gas salesmen generally, for outside the industrial areas cities and towns possess workshops and factories in which gas can be applied for heating and power purposes. Among the ways the specialists in industrial work will be reciprocally helpful will be by giving information as to the systems followed in their work; they will relate their experiences; economy will be promoted by the statements which are made as to problems met with, as to the investigation pursued to realize solution, and the solution ultimately arrived at. By such means the time of others will be saved, by making it unnecessary, should circumstances arise, to go over the same ground. Thus mutual guidance will ensue. Mr. H. H. Creasey, for instance, at the first meeting described the system of the Gas Light and Coke Company in inspecting industrial apparatus, and the resulting business has been excellent—not only in new gas appliances where they were not before used, but in the substitution of efficient for inefficient ones. This has been to the advantage of both the Company and the factory owners. But, of course, the success of such a scheme largely depends upon having the right man for the job—a man qualified for it in every respect.

One thing that at first concerned us was as to the ordinary salesman whose opportunities for industrial business are limited. Though limited, he has some opportunities; and the information given at the meetings would be, if available, of practical value to him. We see that the meetings of the specialized organization will only number four a year; and it is proposed that the members attending should make periodical report to their respective Circles. That is an excellent idea. The information exchanged by industrial gas specialists all over the country will thereby be conveyed to the members whose work is only in small part of the industrial order. In regard to these, a suggestion was made at the first meeting that it would be very helpful to the smaller undertakings if the "B.C.G.A." would appoint on their staff a visiting and advisory industrial specialist, who could undertake to represent a gas undertaking in interviewing a manufacturer, and submit to him a scheme for the introduction of gas heating, or suggestions for improving an existing installation—in fact, anything of a useful nature in this connection. This is a matter the Executive of the "B.C.G.A." will take into account. It would be a development of a very practical nature, and consistent with the co-operative foundation of the work of the "B.C.G.A." There is good precedent for this in the operations of the Fuel Expert of the London Coke Sales Committee. As an alternative, Mr. Goodenough suggests, arrangements might be made for small undertakings to have recourse to the services of the industrial experts on the staffs of the large undertakings. One development produces others—all serving the cause of progress.

## Gas Workers' Wages.

The cost-of-living index figures for the months of September to November were 76, 80, and 81—making an average of 79. It has been agreed that the adjustments of wages to be made under the sliding-scale agreements are: From Thursday, Jan. 1, 1925, the wages of gas workers of eighteen years of age and over will be increased by ½d. per hour in the case of day workers and 4d. per shift in the case of shift workers. The increase will carry, in the case of those undertakings which have paid the same previously, the 12½ p.ct. or 7½ p.ct. bonus thereon in respect of workmen of twenty-one years of age and over.

## More Money for No. 43.

That little cohort of company promoters who operate from No. 43, Cannon Street, seem, as we have indicated recently, very anxious to get in as much money as possible before Christmas; and they are working their machinery for all it is worth to that end. It was only in November that the precious Navenby and Wellingore prospectus helped to inflate our waste-paper bags. Apparently that issue did not net all the thousands of pounds sought for that Lilliputian concern, for already a new edition of the prospectus has been circulated in reconstructed form. No sum is now mentioned as that required for the 10 p.ct. preference shares and 7 p.ct. first mortgage debenture stock. The offer is for a "limited amount" of the capital in each class. To the issue the "Electricity, Gas, Share Debenture Investment and Guarantee Trust, Ltd.," of No. 43, Cannon Street, draw the "special attention" of "Dear Sir, or Madam"—the "dearer" to both parties the greater the amount subscribed. The public must rush for the shares if they are foolish enough to want them, as the "Trust" have only a "few" to offer, "subject to being available on receipt of your application." It is interesting to note that the Trust have been "able to secure some of the debentures." This seems to imply that it was only after a severe struggle at 43, Cannon Street, that those who held the debentures would part with them. There are, of course, plenty of soft-headed people in the world, and the Trust with the horribly long name unfortunately are aware of the fact. Some of our friends who are not in the soft-headed category have sent the December issue of the Navenby prospectus to us, accompanied by remarks which are not flattering to the occupants of the promoting factory at the address already mentioned.

## Magistrates and Smoke Abatement.

The Leeds Chamber of Commerce the other day were addressed by Mr. E. Kilburn Scott on smoke abatement. He referred to the use of low-grade fuel. We all know that, in consequence of the price of coal having risen enormously, a great deal more lower-grade fuel is now used than formerly. But with improved knowledge as to combustion, this ought not to contribute more to the smoke nuisance. Mr. Kilburn Scott rightly assailed the present anti-smoke law as being antiquated. It has not kept pace with our progress in knowledge as to how to do things; and we must admit that even the law as it stands is administered so vagariously that one cannot help thinking that changes are required on the magisterial benches. A certain amount of local or personal interest at times appears to enter into the administration of the law in this respect. Mr. Kilburn Scott has observed that in this matter the attitude of magistrates varies widely in different cities. "Shut-eye" magistrates was a description that he applied. With a Stipendiary Magistrate in Glasgow, 100 p.ct. of convictions are obtained where there is infraction of the smoke law. There will no doubt be objection to this criticism from the magisterial benches; but those whom "the hat does not fit" will be the last to object.

## Central Heating.

Although Mr. Kilburn Scott is an electrical engineer, he is also a civil engineer, and is not obsessed with the idea that there

is nothing but electricity that can deal with the smoke nuisance. He points out that the more extensive use of gas and electric fires would go far towards easing the smoke problem. But he must admit that, from the point of view of our fuel supplies and the pockets of the people, electricity would be an expensive method of dealing with the trouble. Having been resident in America for many years, he is rather favourable to central heating, which in the States and Canada enjoys a large vogue. It is his belief that it will have to be taken up in England. For the major part of the houses, we do not agree with his view. There is a strong prejudice here against domestic heating by convection; people do not mind a proportion, but they prefer the bulk to be of the radiant variety. A paragraph published by us recently [p. 738] recorded that the Housing Committee of the London County Council had considered the adoption of central heating for their dwellings; but the installation costs, with the restrictions under the London Building Acts, are prohibitive. However, Mr. Kilburn Scott is of opinion that the manufacture of smokeless fuel is going to be one of the big things of the future. It is now, if the term "smokeless fuel" has a comprehensive meaning attached to it.

### Coal Export Movements.

The downward movement of coal exports continued in November. The total for the month was 4,758,800 tons, compared with 6,669 903 tons in 1923, and 6,570,758 tons in 1922. The values in November of the three years were: £5,178,129, £8,153,767, and £7,433,280. The part of the total representing gas coal shows up very well in comparison with November last year, but not with 1922. Last month, the shipments were 686,118 tons, as against 683 791 tons in 1923, and 902,028 tons in 1922. The respective values were £712,130, £825,959, and £994,980. The average price of the gas coal shipped last month was £1 os. 9d. In the eleven months of the year, 56,483,748 tons of coal of all descriptions were exported. This total compares with 73,573,713 tons in the corresponding period of 1923, and 58,243,742 tons in 1922. The values were: 1924, £66,507,781; 1923, £92,659,201; 1922, £65,836,846. From the tonnage figures, it will be seen that the total coal exports so far this year are 15,091,965 tons below those for the same period of 1923. Of the totals the shipments of gas coal in the eleven months were 7,761,371 tons; in the corresponding period of 1923, 8,479,743; and in 1922, 8,438,058 tons. The values were: 1924, £8,851,893; 1923, £10,297,099; and 1922, £9,274,004.

### Gas Coke Shipments.

Gas coke had a set-back during November; the quantity being 63,515 tons, as against 133,170 tons in November, 1923, and 115,680 tons in 1922. The values were: November, 1924, £108,911; 1923, £232,189; 1922, £159,023. The average value per ton last month was £1 14s. 3·5d. The eleven months' export of gas coke amounted to 884,552 tons, compared with 1,114 885 tons in 1923, and 816,322 tons in 1922—the value being £1,547,058 for the eleven months, £1,801,504 in the corresponding period of 1923, and £1,154,009 in that of 1922. The exports of metallurgical coke in the eleven months were 1,696,955 tons, which compares with 2,521,239 tons in the same months of 1923, and 1,428,166 tons in 1922.

### A Quarter's Returns.

Interest attaches to the return of the Mines Department for the quarter ended June last. It shows that in that period the saleable coal raised amounted to 61,552,868 tons. Deducting mine consumption (3,793,655 tons) and miners' coal (1,459,750 tons), there was a disposable amount of 56,299,463 tons. The total costs of production were 19s. 3·43d., of which 13s. 8d. was absorbed by wages. Deducting from the costs the average proceeds from miners' coal (1·32d.), the net cost was 19s. 2·11d. The commercial disposals realized an average of 20s. 2·51d.; so that there was a credit balance in the hands of the owners of 1s. 0·4d. The number of workpeople employed was 1,107,457; and the number of man-shifts lost which could have been worked was 5,962,902. The output per man-shift worked was 17·48 cwts.; and the earnings per man-shift worked were 10s. 11·12d. The Mining Association, referring to these figures, point out that the new wages agreement came into force on May 1, so that it affects two months of the quarter. The wages cost per ton was up by 1s. 1d., although the proceeds of the commercial disposals show a reduction of 5½d. per ton. Had the period covered by the quarter included three months under the new agreement—May, June, and July—the whole of the credit balance of 1s. 0½d. would have been obliterated. The average earnings per shift increased from 10s. 2¾d. to 10s. 11d. The output per person per shift shows a further decrease from 17·79 cwt. to 17·48 cwt. Another result of the minimum in the agreement having been fixed at a level that proved to be uneconomic for a number of collieries is shown in the decrease of the number of man-shifts worked from 75,390,000 to 70,417,000—a reduction of about 6½ p.ct.

### Labour and a Mining Policy.

The Executive of the Miners' Federation have accepted an invitation from Mr. Arthur Henderson, M.P., to join with the Labour Party Executive and the Trade Union Congress Executive to inquire into the position of the mining industry, and prepare proposals for a labour mining policy to place before the country, with the endorsement of the whole Labour movement.

## THE INDUSTRIAL FUEL PROBLEM.

**By the Executive Chairman of the "B.C.G.A."**

[REPRINTED FROM THE "B.C.G.A." BULLETIN.]

"Of the making of organizations there is no end," is probably the first comment of the gas manager who is informed that an Industrial Salesmen's Circle has been started by the "B.C.G.A." and who asks why, with Salesmen's Circles in every district in the country, another Circle with separate functions is necessary. The answer to that very natural query is this: The industrial fuel problem is extremely complex and detailed. There are nearly 400 separate ways in which gas can be utilized in industrial heat processes in nearly 4000 separate trades. The object of the "I.S.C." is, mainly, not to discuss general principles of salesmanship and their practical expression in the organization and execution of district service policy, which is one of the chief functions of the Salesmen's Circles throughout the country, but to provide the means whereby the salesmen who specialize in industrial fuel problems can meet and exchange experiences and problems connected with their special work.

It is obviously a very great waste of time, energy, and money for a man in (say) London or Leeds to be thinking out the solution of a difficult problem in industrial heating which he has just encountered, and carrying out experiments in his search for that solution, when another man in Birmingham, or Cardiff, or Sheffield has previously met the same problem, been through all the trouble of puzzling out the solution and all the experiments by which, through trial and error, this solution has been discovered and proved, and could tell his colleagues all about it if he knew that the problem had arisen elsewhere. The first meeting of this highly-specialized circle, held recently in London, and attended by representatives from the North, Midlands, West, and South, made it very clear to those who were present that the Circle would serve a most useful purpose. This it will do, not merely through its meetings (which will not be very frequent, at any rate until it is certain that frequent meetings are necessary), but through the establishment of personal acquaintance between salesmen all over the country, leading to a greater readiness, as well as opportunity, to pool knowledge and experience; through the provision of more material for "A Thousand-and-One Uses for Gas" (to the value of which strong testimony was given by those at the first "I.S.C." meeting); through the arrangements made for the publication in the "Bulletin" of outline particulars of problems requiring solution, with a request for help from anyone who has already dealt with similar difficulties; and through the members of the Industrial Circle acting as liaison officers charged with the duty of conveying periodically to the District Circles the results of the work of the specialized organization.

A point that emerged from the discussion at the first meeting of the "I.S.C." was that the development of the industrial fuel load was a question for consideration, not only in the great "industrial centres," such as Birmingham and Sheffield, but in every town and city where factories and workshops exist—that is in almost every one. It is therefore hoped that the work of the new Circle will be of widespread practical benefit; that it will be attended by an increasing number of those who realize the great possibilities of business development that lie in the industrial field; and that the industry will have growing reason to regard the newly-formed Circle as a necessary part of the considerable machine that is requisite to make the industry a completely organized union of forces.

The next meeting of the Circle will be held in Leeds, by the courtesy of Mr. C. S. Shapley and the Corporation Gas Committee, on Monday, March 2.

## PERSONAL.

The retirement of Mr. WILLIAM HAMBY from the Secretaryship of the Sheffield Gas Company was last Friday evening made the occasion of a complimentary dinner at Stephenson's Exchange Restaurant. Mr. Ralph Halkett, the General Manager of the Company, presided, and there was a large number of officials present. During the evening, Mr. Hamby was presented by the staff with a gold watch and chain as a token of the high esteem in which he is held. In making the presentation, Mr. Halkett said all the members of the staff were losing a sincere friend, and the Company a most devoted and loyal servant. While they regretted his retirement, they hoped that he would long be spared to enjoy the rest and leisure so well earned. Mr. Hamby entered the Company's employ in 1881, and was appointed Secretary in October, 1907. During his 43½ years' service, he has witnessed the growth of the Company in a remarkable degree, as was shown by figures which Mr. Halkett quoted. The make of gas for the year 1881 was 1227 million c.ft.; at present it is 4624 million c.ft. —an increase of 277 p.ct. The total number of consumers in 1881 was 39,000; to-day it has reached almost 117,000. Mr. Hamby has served under three General Managers—Mr. Thomas Roberts, Mr. Hanbury Thomas, and Mr. Ralph Halkett. Mr. Chamberlain, Mr. Meakin, and several other members of the staff spoke of the sterling character of Mr. Hamby. In thanking the staff for the presentation, Mr. Hamby said he would value the watch and chain highly; they would always bring back to him pleasant memories of the many friends at Commercial Street.

Mr. WILLIAM MURRAY, who has for 33 years occupied the position of Manager of the Uttoxeter Gas-Works, is retiring at the end of January. He went to take up his duties at Uttoxeter in March, 1891, on the death of his father, Mr. Stephen Murray, who was Manager of the works for 30 years. Mr. W. Murray learnt his duties under his father, and was at Burslem Gas-Works for a few years. He also served a year as an inspector with the Whitworth Vale Gas Company. Mr. Murray, who is 73 years of age, has witnessed a great many improvements at the Uttoxeter Works. It is an interesting fact that three of Mr. Murray's sons, who are all connected with gas-works, learned their business at Uttoxeter. Mr. Murray will be succeeded by Mr. G. SURTEES, who is at present Manager of the Fenton Gas-Works.

We have been asked by Messrs. Thomas Glover & Co. to make known the fact that they have, with the greatest regret, accepted from Mr. GLOVER CLARK his resignation of his position as Sales Director. This regret is fortunately tempered to the extent that Mr. Glover Clark will remain on the Board and continue to act as a Director of the Company. In making this formal announcement, the firm feel it difficult to express adequately in words their sense of indebtedness to Mr. Glover Clark for his self-sacrificing devotion to the firm's interests over so many years of valuable service—a service which has materially contributed to the reputation of the name of Thomas Glover & Co. It is a real satisfaction to the Board to feel that, while he relinquishes his executive position on the sales side, his services as a Director are to be fully maintained. Mr. H. F. POTTER, who has for some years past held the position of Sales Manager for the London District, will continue his present duties, but in addition act as Sales Manager both for Messrs. Thomas Glover & Co., Ltd., and also for Messrs. R. & A. Main, Ltd., in connection with London and in the South.

The Council of the Physical Society of London have decided unanimously to award the Second Duddell Memorial Medal to Prof. C. VERNON BOYS, F.R.S. The award is "for the advancement of knowledge by the invention or design of scientific instruments or by the discovery of materials used in their construction." The presentation of the medal will take place on Feb. 13 next.

Among newly-elected members of the Society of Chemical Industry is Mr. CECIL B. MARSON, Gas Research Fellow, Fuel and Metallurgy Department, Leeds University.

Mr. T. A. J. GUYATT, of Ely, has been appointed Assistant Sales Manager to the Aldershot Gas, Water, and District Lighting Company.

Councillor S. W. B. STEPHEN, the Chairman of the Smethwick Gas Committee, has been added to the Commission of the Peace for the Borough of Smethwick.

## OBITUARY.

Mr. BENJAMIN GREAVES, F.I.C., Coke-Oven Consultant, of Leeds, died last week at the age of 55. He was Consultant to a large number of collieries in the United Kingdom, and his wide experience rendered his advice most valuable. He was an early student at the Yorkshire College, and for some years lectured on the subject of bye-products recovery at the University of Leeds.

**"Synthetic Organic Compounds."**—This is the title of a new book written by S. P. Schotz, D.Sc., B.Sc., A.R.T.C., F.I.C., and published by Ernest Benn Ltd. at 45s. net. In this volume are collected the latest scientific and technical data relating to a wide range of compounds of the greatest industrial importance.

## ELECTRICITY SUPPLY MEMORANDA.

IT is well known that, difficulties notwithstanding, the electricity supply industry is very anxious to secure a cooking load, because it is an all-the-year-round demand. It is also desirous of getting some of the heating business; but it is not so keen on this, in view of the fact that it is a demand limited to the colder and darker months of the year, and even then is very irregular. In truth, some electrical men are persuaded that, all things considered—especially capital expenditure on plant and mains, which will be only spasmodically employed—the heating business, at a low price per unit, merely adds to their difficulties. Of course, up to the present, they have simply touched the fringe of either branch, so that they have not experience of the same order as the gas industry as to what a heavy number of connections in both branches would mean to them, altogether apart from the question of the extravagant use of fuel. We do not think electrical engineers will dispute the superior experience of the gas industry in these matters. One thing the experience demonstrates is that judgment should be based on the worst known conditions. Between Tuesday evening, Dec. 9, and the following Thursday night, we had a continuous fifty hours' fog, during the greater part of which the darkness was that of night—and worse. This meant artificial light everywhere. The darkness was accompanied by low temperatures. The gas undertakings of London had, therefore, during that long period to meet the lighting, heating, cooking, water-heating, industrial, and miscellaneous loads. In the editorial columns of the "JOURNAL" last week, the actual consumptions in two of the London Companies' areas were quoted; but they are worth enlarging upon here, because every cubic foot or therm of gas demanded by the public was supplied without the Companies turning a hair. In the first place, in the electricity industry much is made of the value of a diversity of load. That is all right normally. But when the diversity of use heaps up into a concentrated mountain of demand, as in the case of gas during such continuously dark and cold days as those to which we are referring, then the conditions would become very awkward for electricity undertakings.

**Flights of Demand.**

It will be sufficient if we refer to the figures applying to the area of the Gas Light and Coke Company. During those days, that Company registered new records for a day's demand from the public, though, of course, those electrical men who look at that Company through the wrong end of a telescope observe a deplorable shrinkage in it. To show how the Company's load suddenly mounted up, we may quote the figures for four days. On Monday, the 8th, the consumption was 134,572,000 c.ft. (air temperature, 45°); Tuesday, 142,825,000 c.ft. (44°); Wednesday, 163,882,000 c.ft. (40°); Thursday, 163,004,000 c.ft. (37°). It will be seen that there was a leap in demand as between Monday and Wednesday of 29,310,000 c.ft., the thermal value of which alone is equal to 4,285,087 KW.-H. The consumption on the Wednesday was equivalent to 81,941,000,000 B.Th.U., or 819,410 therms; and this heating value represents 23,959,357 KW.-H., to generate which 23,959 tons of coal would be required, working at the excellent figure of 2·24 lbs. per unit generated. The figures have another lesson; and it is that the productive capacity of a concern with a large heating load must have a good margin of safety over previous maximum days' figures. For example, take a day in November, 1923—foggy, and with a temperature of 32°—the output then reached 156,763,000 c.ft. Last Wednesday, the output was 7,119,000 c.ft., or 35,595 therms, more than on that maximum day of 1923. This additional thermal value is equal to 1,040,800 KW.-H. The data show that electricity undertakings would have something to do to be prepared to meet such flights in demand, and that "something" would not be a profitable investment for them at the price which they perforce sell heating units, and then have to confess that they are dear in comparison with other heating agents. One point more. On Wednesday, Dec. 10, the Gas Light Company had at midday to meet a peak load for lighting, heating, and cooking of 12 million c.ft. per hour, or 6,000,000,000 B.Th.U. (60,000 therms). To place at the disposal of the consumers a similar quantity of heat, 1,754,386 KW.-H. would have to be supplied per hour. We know it will be claimed that electricity is used at 100 p.ct. efficiency for room heating, against 75 p.ct. for gas-fires. The poor efficiency of the hotplate of electric cookers will not be mentioned. We need not go into those matters, because the information given in the foregoing notes will bear more than a little meditation on the part of our electrical friends.

**Output Examined.**

The Sheffield Corporation Electricity Department have been trying a rental wiring system. The "Electrical Times" refers to the considerable interest that was aroused in the experiment, and to the results being valuable as a guide to other undertakings. They will be, we should imagine, as a deterrent, for the revenue realized after twelve months' work cannot go far towards paying for it, the book-keeping, &c., let alone the repayment for installation, cost of current, &c. Advertising has been resorted to, posters have been issued, and there has been canvassing. Thereby the scheme has been brought to

**Rental Wiring Scheme.**

the notice of a large number of citizens, and no less than 2145 houses have been visited. We should like to know what all this exploitation has cost, because the revenue for the twelve months from the completed installations amounts to the modest sum of £74 12s. Only 44 residents adopted the scheme. While 82 residents signed application forms for an installation, thirteen of them did not comply with the conditions. In all 373 lights were installed at a cost for labour, materials, and supervision of £369 0s. 1d., being an average of 19s. 9d. per light. Under the system the Department instal complete in private residences the wiring and fittings for not more than ten lights, at a rental of 1s. per quarter for each light. The capital cost, it is said, is returned to the Department after five years' hire has been paid. If the capital is repaid in five years, and the rental per light during that period only amounts to 20s., there is nothing supplied in it for interest or depreciation. Experience is that the scheme has not been favourably received by the occupants of the smaller houses, principally on the ground that the rental is too high and that it has to be paid in perpetuity. The Electrical Engineer points out that a rental of 6d. per quarter would return the cost of installation in about ten years; and he thinks if this price were fixed for rental, with an alternative figure for purchase by instalments over a period of years, many of the objections would be overcome. On the figures presented, the 6d. per quarter per light would not allow anything for interest, depreciation, and maintenance during ten years. It seems pretty evident that the Electricity Committee are not particularly enamoured of the results; and so they have instructed the General Manager to prepare a scheme, for a selected working-class district, on the basis that all wiring and fitting, including the first supply of lamps, be done at the cost of the Department, current to be supplied through slot meters at a price to cover its cost, rent of meter, and interest and sinking fund on the installation. It will be interesting to inspect the financial details of the new scheme. At any rate, the Committee are obviously of the opinion that the rental wiring system is not going to add much to the girth of their business.

**Hire-Purchase Wiring.**

Glasgow is persuaded that high installation costs have kept many back who would otherwise have adopted electric light It is learned from the "Electrical Times" that to overcome the difficulty the Electricity Department have adopted a scheme to wire within their area of supply a limited number of houses on a three years' hire-purchase system, and have secured rock-bottom prices (based on large numbers) for wiring various sizes of tenement houses. The scheme has only been in operation since the beginning of September. Broadly speaking, proprietors are co-operating to the extent of bearing the cost of the main rising cable to supply the whole property, and up to the present date between 200 and 300 houses have been wired. At present thirty houses per week are being wired. There is promise of further particulars after six months' experience of the scheme.

**Practical Experience.**

The Housing Committee of the London County Council have had some practical experience with electricity for cooking purposes in tenements; and it has been found unsatisfactory. We do not know what else was expected. Just as two and two make four, so electricity with a value of 3420 B.Th.U. per KW.-H. must, at any ordinary price—1d., 1½d., or 2d.—be a very expensive heating agent. The information as to the view of the Housing Committee on this point was divulged when they introduced a recommendation to the Council in connection with the East Hill Estate, which comprises some 535 tenements. One part of the recommendation accepted an offer by the Wandsworth, Wimbledon, and Epsom District Gas Company for installing a cooking-stove and two points for lighting (without cost to the Council), the gas being supplied through prepayment meters. The second part of the recommendation was that the County of London Electric Supply Company's offer should be accepted to supply current for general lighting purposes at 7·7d. per unit—the Council bearing the cost of the installation in the tenements. The duplicate installation is a positive waste; and the 7·7d. per unit is a charge which the occupiers of the tenements will not relish. Furthermore, the electricity is to be supplied in bulk to the Council, who are to collect the payments from the slot meters. Electric slot meters cost money, so do wiring, fittings, lamps, collections, and book-keeping; and with the small consumption there will be for lighting, we shall be interested in inspecting the Council's balance-sheet (if available) appertaining to this adventure. The only satisfaction is that the tenements and the occupiers are not to be ruined by the use of electricity for cooking. There was criticism as to the want of enterprise on the part of the Electric Supply Company; and it was this that brought the intelligence from Col. Levita that the Committee had had for a long period a tenement installation for both lighting and cooking, and the electric cooking failed to give satisfaction to the tenants. Whatever the reasons, the fact remains that electricity for cooking was not liked, and it was found more expensive than gas. For heating water, too, gas was found to be more economical and satisfactory. After this, it is unlikely the Housing Committee of the London County Council will be tempted to indulge in experiments in electric cooking and heating in tenement houses.

**No Option.**

The Woolwich Borough Council have their own electricity undertaking. Among other features of enterprise, they have developed an estate at Eltham for which they have adopted the uncivilized course of having no gas-mains. There is a shortage of houses, and people are wanting homes; but this despotic authority are not prepared to let them have an option as to the light they shall use or the agent they shall employ for cooking. They know well that, if the tenants had an option, they would not by far universally patronize the electricity concern. But there it is; the tenants are bound to use electricity. So in the 500 houses the lighting is by Borough Council electricity, and the electric cooker must also be employed, no matter at what cost, inefficiency, and unreliability. The tenants are charged a flat rate of 2d. per unit, which includes the cost of hiring the apparatus. The other consumers should inquire into these preferential terms. Now the Council have gone further, and have erected four all-electric houses. We sincerely pity the people who are compelled from force of circumstances to tenant them. Their rental is to be 16s. a week, including rates and taxes. There are nine lighting points, heating plugs in all bedrooms, living room, and parlour. But it seems there is to be only one 3-KW. fire, and one 600 watt bowlfire; so that we imagine these have to be carried from room to room as required. There is also a full-range cooker, one wash boiler, and water-heating apparatus. In every case, the water-tanks are fitted with heaters of small wattage, and are either connected to the supply continuously or (if disconnected) must be switched-on twelve to fourteen hours before required! Probably the most interesting point is the estimate of cost to the consumer as prepared by the Borough Electrical Engineer; and a remarkable estimate it is:

| Units Per Annum. | | | |
|---|---|---|---|
| Lighting: 100 at 6d. per unit . . . . | £2 | 10 | 0 |
| Heating: 1600 at 1d. per unit . . . . | 6 | 13 | 4 |
| Cooking: 1500 at 1d. per unit . . . . | 6 | 5 | 0 |
| Water Heating: 2200 at ¼d. per unit . . | 4 | 11 | 8 |
| | £20 | 0 | 0 |

The rent of 16s. per week, including rates, amounts to £41 12s. a year; so that the estimate for lighting, heating, and cooking only will add nearly 50 p.ct. to that figure, or an additional 7s. 8d. per week, which is a heavy expense for people in these circumstances. Even then one can question the truthfulness of the estimate by reference to only the one item of heating. The 1600 units allowed for this purpose represents merely 5,472,000 B.Th.U. If this were used at even 100 p.ct. efficiency, it represents less than the heat that can be usefully obtained from 1 ton of coal at an efficiency of 24 p.ct.; and that 1 ton of coal would not cost £6 13s. 4d. Does the Borough Electricity Engineer suggest that 1 ton of coal per annum would be sufficient in a house of this description for room heating purposes in such a climate as this? If he said "Yes," our reply would be "Don't be silly." It might not be polite, but it would be very appropriate. Another interesting thing is that to obtain that 1600 units, which cost £6 13s. 4d., about 2 tons of coal would have to be used at the generating station. This is not coal conservation. The other items are not so easily checked; but if on the same lines, the tenant of one of these houses will have a rude awakening when he compares his actual annual consumption with the estimate. With the small provision made in it for heating, there will be several cold rooms and much discomfort in these houses.

## Therms at the Wembley Pageant.

The Board of Trade Staff have a magazine, which is printed under the lugubrious title of "Boneblack." It makes good reading—light and spirited, with sparkling humour (unbottled). A copy of the October issue has come to us *via* several hands. An article is headed "At the Pageant"; and the writer gives an account of the part taken by the Board in the historical spectacle at Wembley. The various "scenes" are described—from the establishment in 1786 of the Committee of the Privy Council. Most popular was the march-past representing the present activities of the Board. First came all the living Presidents; and though they found it a little difficult to keep in step, their arrival made a very impressive opening. The Presidents were followed by the various economic experts of the Department, leading in what the programme described as an "economic man" (*homo economicus*). "We ourselves cannot refrain from saying that we have seen few more horrible sights, even in the museum of the Royal College of Surgeons." Then the climax: "The 'economic man' and the experts had hardly left the arena when the Director of Gas Administration led in a large band of therms, who gambolled about in the Stadium. The Director, like Pan himself, played a plaintive air on his pipe, to which the therms responded with ecstatic cries. The most striking part of the therm is its bill, which is long and never stops growing." [One of the stalwarts on our staff would like to know who was the author of this. It is suspected that Mr. B. is responsible. We must not, however, reveal the name, as, the Board of Trade being a Department of State, political trouble might ensue. As to the last passage of the quotation, it is a case of cause and effect. The "never-stop" growth of the "bill" is due to enlarged and active use—just as exercise develops the muscles.—ED. G. J.]

# THE UNIVERSITY OF LEEDS.

## Jubilee of the Yorkshire College of Science, and Coming of Age of the University.

THE Jubilee Celebrations of the Leeds University, which were held from Dec. 15 to 20, have been rich in reminiscence of a splendid past, and in visions of a still more splendid future. Situated in one of the great industrial areas in the country, and famous for its technological departments, the University may justly claim a position among the most progressive of modern universities. Already the gas industry owes much to the Department of Coal Gas and Fuel Industries, not only because of the valuable research work which has been, and is still being, done in conjunction with the Institution of Gas Engineers, but also for the excellent training of those who intend to take up responsible positions in the industry. It is, perhaps, too early to appraise the leavening influence of the University's work in this connection; but that it is great will be unquestioned by all who have the welfare of the gas industry at heart.

### A BRILLIANT PAGEANT.

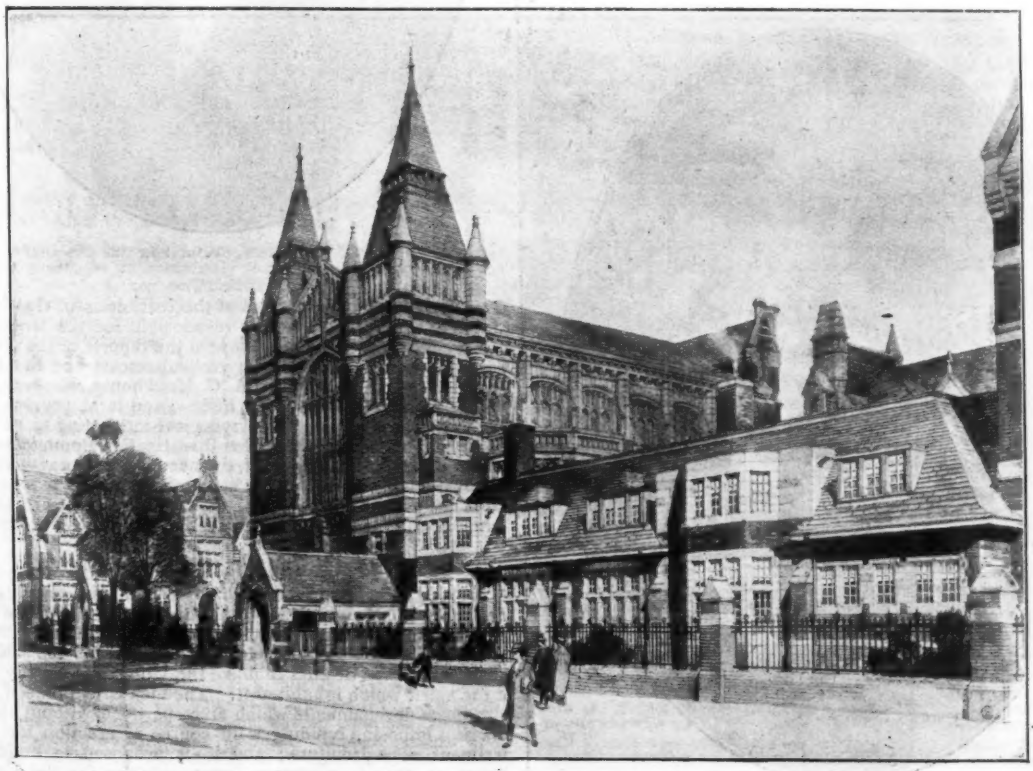
Last week's celebrations commanded widespread interest. The universities of the country were represented by their Vice-Chancellors; and from further afield came delegates representing Australia, New Zealand, Canada, India, Hong Kong, South Africa, and Malta. Many learned societies and institutions sent delegates—as, for example, the Royal Society, which was represented by Prof. Arthur Smithells and Sir Dugald Clerk; the Society of Antiquaries, represented by the Earl of Crawford and Balcarres, and Prof. Peers; and the British Academy, of which the Earl of Balfour was one of the representatives. The programme was one of general interest, including formal and ceremonial functions. On Sunday evening there was a special service at Leeds Parish Church; the preacher being the Archbishop of York. The official opening ceremony took place at the University on Monday morning, followed in the afternoon by a reception at the Medical School, and in the evening by the University dinner. Other events in a crowded week included the reception of delegates, many of whom presented congratulatory addresses, and the conferment of honorary degrees. The value of the University's association with local educational bodies was marked by official visits by the Leeds Corporation and county boroughs in Yorkshire; and this feeling was pleasantly reciprocated by the Lord Mayor of Leeds (Mr. C. G. Gibson), who invited members of the University and their guests to a luncheon on Tuesday. Thus Leeds was the rendezvous of a distinguished gathering of men renowned for their learning and for their service to humanity; and the proceedings of the week may well be termed a brilliant pageant.

Only a brief outline sketch can be given here of the interesting events which took place; but before passing on to this, it is appropriate to say a few words about the history of the Leeds University and its outlook for the future.

### THE PAST.

The Institution had three separate beginnings. Its oldest part—the School of Medicine—started in 1831. The Yorkshire College of Science was instituted in 1874, and at about the same time a local University Extension Committee (in association with Cambridge) commenced operations which provided the foundation for the Arts Faculty of the College. There were thus three distinct movements—one relating to the study of medicine, one to the study of science, and the other to the study of literary and historical subjects. In view of the association of Cambridge University with the initial development of the College, it was very fitting that Lord Balfour, who is the Vice-Chancellor of Cambridge University, should be one of the principal guests at last week's celebrations. The union of the Faculties of Arts and Science took place in 1877; and thereafter the words "of Science" were omitted from the title of the College. The next important event was the amalgamation of the Yorkshire College with the School of Medicine, which took place seven years later; and the College came into its present status with four Faculties—Arts, Science, Technology, and Medicine. In 1887, the combined College was admitted as one of the constituent colleges of the Victoria University. Seventeen years later, in 1904, the Yorkshire College obtained its charter as the University of Leeds.

During the past twenty-one years the University has gone from strength to strength under two Vice-Chancellors, the late Sir Nathan Boddington (1904-11) and Sir Michael Sadler (1911-23). From small beginnings it has grown until now it is one of the most important institutions in the country, drawing students from all parts of the world. It has more than doubled in size during the last ten years. There are now 45 departments of study, and the number of full-time students is nearly two thousand—apart from the part-time and evening students and some thousands of extra-mural students attending tutorial classes arranged by the University in different parts of the country. The University is fortunate in having secured as its Vice-Chancellor Dr. J. B. Baillie, O.B.E., M.A., D.Phil., who for 22 years has occupied the Chair of Moral Philosophy at the University of Aberdeen. The new Vice-Chancellor comes to Leeds with a distinguished reputation gained in academic life, as a writer, and in public service.

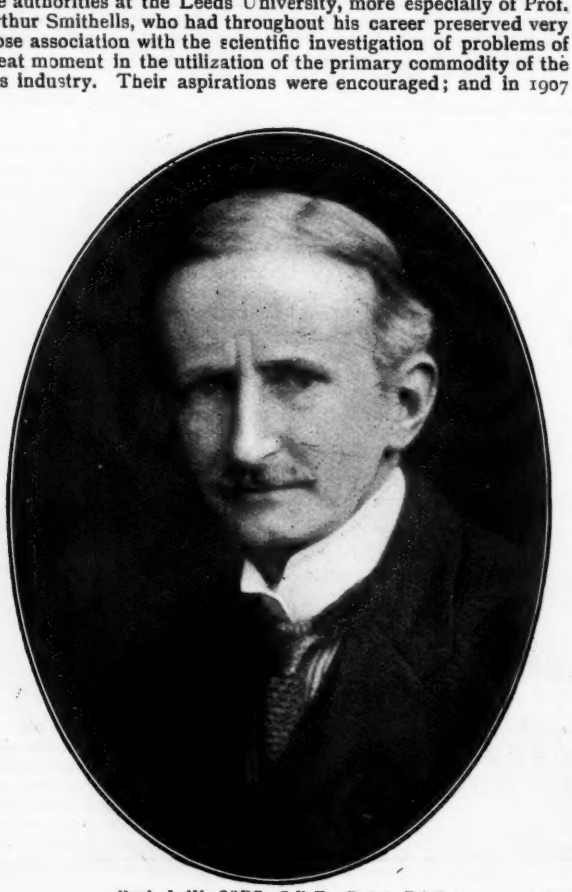


LEEDS UNIVERSITY—THE MAIN BUILDING.

The Vice-Chancellor, Dr. J. B. BAILLIE, O.B.E., M.A., D.Phil.

### THE FUEL DEPARTMENT.

The gas industry is particularly concerned with the Department of Gas Engineering, Fuel, and Metallurgy, the general history of which is common knowledge to readers of the "JOURNAL." The desirability of a higher standard of technical education had impressed itself so firmly on the minds of the leaders of the gas industry, that in 1907 it was felt that the time had arrived to make provision for the necessary training of students of gas engineering. It was a matter, too, which had lain very near the hearts of the authorities at the Leeds University, more especially of Prof. Arthur Smithells, who had throughout his career preserved very close association with the scientific investigation of problems of great moment in the utilization of the primary commodity of the gas industry. Their aspirations were encouraged; and in 1907 the Department of Gas Engineering came into being, with Prof. W. A. Bone at the head. In the "JOURNAL" for July 16, 1907, the hope was expressed that the Leeds University would come to be looked upon as the Charlottenberg or the Harvard of the British gas industry; and that hope has been fulfilled. During the seventeen years which have elapsed since its inauguration, the Department has wielded a powerful influence in, and been of inestimable benefit to, the gas industry. As it exists to-day it possesses unique facilities for both general training and research. It is run on admirable lines, and at its head is a man recognized as an authority. Prof. J. W. Cobb has wide practical experience, and his deep and balanced judgment is a tremendous asset to the gas industry.



Prof. J. W. COBB, C.B.E., B.Sc. F.I.C.

We must also mention the excellent work of Mr. H. J. Hodsman, the Lecturer in Gas Chemistry, for whom all the students who have been fortunate enough to be brought into contact with him have a deep and lasting regard. His encouragement and very real help have left an indelible mark on the minds of all his pupils, and are responsible for the acquisition of that outlook which makes for true progress in any industry in which science plays a part.

The latest addition to the Department is the Corbet Woodall coal gas plant, which was described at length in the "JOURNAL" for April 2, p. 27. This has been designed to secure the elasticity in working and the precision which are necessary for the prosecution of investigation, and is not merely a small-scale reproduction of a gas-works. Dr. A. Parker, who, as Research Chemist to the Gas Investigation Committee of the Institution of Gas Engineers and the Leeds University, is responsible for the large-scale experimental work in connection with the reports of the Committee dealing with carbonization in vertical retorts and the efficiency of water gas plants, and Dr. A. C. Monkhouse, who was formerly the Institution Gas Research Fellow, and is at present assisting Dr. Parker, are at present carrying out interesting work on fractional carbonization for the Gas Investigation Committee. Many minor alterations in the plant, to encounter the practical difficulties of the investigation, have been made since its inauguration in April last; and all in the gas industry look forward to the publication of the results of the promising work now in progress.

Mr. H. J. HODSMAN, Lecturer in Gas Chemistry.

### THE FUTURE OF THE UNIVERSITY.

Great new building schemes have been made necessary by the University's growth. Many generations of work will be involved in these schemes, and the ultimate expenditure may be nearer £1,000,000 than £500,000. In a recent address the Vice-Chancellor said it was desired to make the University worthy in form of the spirit which inhabited it. The idea is to proceed at once with those developments which must be done without delay. A new and imposing building is in course of erection for the Department of Agriculture; and it is proposed to build a new library, to provide adequate accommodation for the University Union, and to form a Dental Department.

### The Week's Proceedings.

The first official event of the celebrations was a ceremonial gathering in the Great Hall of the University on Monday, Dec. 15. The Duke of Devonshire in his Chancellor's robes, and the Court, Senate, and past and present members of the staff and students, all in their academic robes, lent brilliant colour and magnificence to the scene.

#### A Few Extracts from the Speeches.

The CHANCELLOR remarked that at Leeds they had a University in the best sense of the word. It was not merely a collection of a number of departments; the institution represented something more than the sum of its component parts. To carry out its functions, a university had to possess something more than a mere training, education, and research work; it should have a corporate life. This, he thought, Leeds could claim to have achieved.

#### Science and the Welfare of Man.

The VICE-CHANCELLOR, in the course of his address, said that, starting from the elementary proposition that science contributed to the welfare of man, the University had always held that the direction of scientific inquiry into the means by which man attained his welfare could and should properly fall within the functions of a university. The cultivation of science for its own sake, apart from its bearing on human welfare, did not imply a higher or finer conception of science than that which would bend science to human needs. On the contrary, it was poorer, for in the eyes of science there was nothing common or unclean, and nothing unworthy of its attention. If a globe of gas like the sun was worthy of investigation in the interests of man, why should a jet of coal gas be unworthy if undertaken in the same interest? The dignity of science was to be determined by its appeal to the intellect, and not by the appeal to the nostrils. The various sciences were but the ministers and messengers of the spirit of truth to the mind of man. The conception of the scope of science which had been accepted and applied in the institution of the Leeds University involved a more complete view of the nature of science and its purpose for mankind than that which restricted the pursuit of science within the narrow limits of abstract thought. What was aimed at was to clarify and enlighten the more capable youth of Yorkshire, so that they should raise the mental level of citizenship, and serve their country in their day and generation.

#### Reminiscences.

After the Vice-Chancellor, several former members of the staff and former students spoke. Sir DUGALD CLERK, to whom pride of place was given, recalled that fifty years ago he had the distinction of being the first assistant at the Yorkshire College to the then Professors of Chemistry and Physics, later known as Sir Edward Thorpe and Sir Arthur Rücker. The total staff was then six, but now there were about fifty Professors, and a total staff of something like three hundred, in a University which in many ways, theoretical and practical, had done work second to none in the world.

#### Surgery in Leeds.

During the afternoon a reception was held in the Medical School, which was attended by a large number of the guests of the University. After receiving the guests, the Duke of Devonshire presided at a gathering in the Library, and the Earl of Balfour was among the guests present. Sir Berkeley Moynihan, the famous Leeds surgeon, gave a lecture on the history of surgery in Leeds. Speaking of the future, Sir Berkeley said he believed that the paths of modern surgery had been explored nearly to the end. The methods of surgery could scarcely be made more safe than they now were. Operations of the greatest severity were performed with an absence of risk that left little hope of betterment. Much remained to be done, however, in scientific research. Immense though the achievements of surgery had been in this respect, a broader method was needed. They looked to the University for this help.

#### University Dinner.

The University dinner was held during the evening in the Town Hall, Leeds. After the Loyal Toast had been honoured,

The CHANCELLOR gave the toast of "Our Guests." They welcomed their guests, he said, not only for what they represented, but for the great position they occupied in many fields, and in many aspects of national life. There were present the representatives of fifteen universities in the old country, four university colleges, and thirty universities from other portions of the British Empire.

#### Application of Science.

The EARL OF BALFOUR, in the course of a magnificent speech, said that he was profoundly convinced that of all the instruments now in existence for the material betterment of mankind, science and its application was incomparably the greatest. An immense amount of contention and embittered controversy was aroused with regard to the distribution of material wealth. However important these controversies might be, unquestionably the production of wealth was a more fundamental issue than its distribution. Its production was the result of judiciously applied science. If application of science was to be the direct source of material amelioration of the lot of man, science itself, the acquisition of knowledge, could not be pursued effectively in the spirit of wealth acquisition. To have applied science, one must have pure science; the former was merely the particular use to which the latter was devoted. Probably they would never further knowledge effectively until the stimulus was not material gain, but the joy of augmenting knowledge. The curse of specialization, with the enormous growth of knowledge, was inevitable. How then could a university be a unity from the point of view of study? Lord Balfour suggested that this very specialization was an additional reason for making universities wide in their embrace. Though students could only devote themselves individually to a fraction of the subjects taught, they were brought face to face and into constant social intercourse with other students pursuing their lines of inquiry subject to other influences. Out of this grew that general university culture which was an absolute necessity in modern times.

#### Events of Tuesday, Dec. 16.

The events of Tuesday commenced with the reception of delegates from the Empire's Universities and many learned societies. Speeches were made by the representatives of the Old Universities, Australia, Canada, New Zealand, South Africa, and India. Prof. Smithells, who was very warmly welcomed, extended the congratulations of the scientific societies and institutions as the representative of the Royal Society. Recalling that the educational foundations of the University were laid in science by four eminent Fellows of the Royal Society, Prof. Smithells said they knew how much the fortunes of the University had depended on these pioneers, not only as men of science, but as men strong in faith and in foresight, and men with an unusually strong grasp of great educational principles. The good repute of the University had come in a large measure from the opportunity it had had, and had taken, in the cultivation of natural science, and in particular in bringing its work right up to the frontiers of industrial life.

In all no fewer than ninety-six universities and colleges, and historical, humanistic, and scientific societies and institutions were represented. The Institution of Gas Engineers was represented by Mr. J. Ferguson Bell, Mr. C. F. Botley, and Mr. W. T. Dunn; and the Society of British Gas Industries by Mr. C. A. Goodall. Mr. J. W. Drake, who was to have been the other representative, was unfortunately unable to attend, owing to illness.

The following address was presented on behalf of the Institution of Gas Engineers:

We, the President, Council, and members of the Institution of Gas Engineers, tender our sincere congratulations to the Chancellor, Court, Council, Senate, and members of the University of Leeds on the attainment of the 21st anniversary of the University and on the completion of the 50th year since its foundation as the Yorkshire College.

We note with pride and appreciation the special character and endeavours of the University in striving to bring scientific research and training into direct association with the needs of the industrial community.

This association, so far as our industry is concerned, has been fostered by the founding in the University of Leeds of the Livesey Professorship of Coal Gas and Fuel Industries, the Gas Research Fellowship, the Corbet Woodall Scholarship, the Corbet Woodall Memorial Experimental Gas Plant, and the establishment of a Joint Committee of the University and the Institution for the purpose of investigating problems of the gas industry.

We are able to testify from our direct experience the value of the co-operation between the University and our industry, not only in the work which has already been done in furthering the great cause of the conservation of coal, but also in training young men destined, as we hope, to place our own and cognate industries on a thoroughly scientific basis.

Much has already been accomplished. We are convinced that the future holds a splendour of opportunity and achievement of which the University of Leeds will fully avail itself.

(Signed) J. FERGUSON BELL, *President.*
W. E. PRICE, *Hon. Secretary.*
WALTER T. DUNN, *Secretary.*

#### Conferment of Honorary Degrees.

During the afternoon honorary degrees were conferred upon twelve persons who had rendered distinguished services; among the recipients being the Earl of Balfour and Emeritus Prof. J. B. Cohen, who is well-known to the gas industry in connection with his researches into the problem of smoke. The thanks of the recipients were expressed in a brief speech by Lord Balfour, who said that he cherished no misgivings as to the future of the University, for they had been able to watch it from its inception and through its rapid, continuous, and uninterrupted growth during the first fifty years of its existence. It required no exercise of reckless prophecy, no audacious peering into the secrets of the future, to say that the institution would build a fabric of enduring fame to the honour and glory of learning and to the benefit not merely of their country but of all mankind.

#### Presentation of Portraits to Sir Michael Sadler.

On the Tuesday evening a large gathering took place in the Great Hall of the University, to witness the presentation to the University, and to Sir Michael Sadler, of portraits which had been subscribed for in token of appreciation of Sir Michael's work in the University during the years of his Vice-Chancellorship. Besides a three quarter length portrait which is to be hung in the University, a smaller replica was provided for Sir Michael Sadler's own possession. Both are the work of Mr. Henry Lamb.

#### Unflagging Determination.

Sir MICHAEL SADLER, who was most cordially received, after paying tributes of affection to many connected with the University, spoke of the university movement in Leeds and Yorkshire. The Yorkshire Universities, he said, while strongly marked by the characteristic outlook and temper of the region which it was their first duty to serve, were at the same time conscious of the national aspect of their task. Despite the habit of speech, or caution, or diffidence, which had caused many of the earlier promoters of these Universities to urge too habitually in their support arguments drawn from considerations of industry or commercial advantage, the student was able to discern behind the veil of such over-emphasized utilitarianism the presence of hopes and convictions which glowed with a passion for the betterment of the lot of the masses through the extension of educational opportunity to all

who had the character and talent to profit by it. What impressed the student of the history of the University of Leeds was the unflagging determination and industry with which, for fifty years, its pioneers and chief supporters had stuck to their purpose—a purpose which had widened with their experience, and had flinched before no difficulties.

### A Series of Visits.

The first two days of the celebrations having been devoted to what may be termed the serious and ceremonial side of the events, the remainder of the week was devoted to functions of a more or less social kind. On Wednesday morning a party of delegates visited two of the University Halls of Residence—Devonshire Hall, where 120 men students live, and Weetwood Hall, where there are between thirty and forty women students. In the afternoon, about 350 Yorkshire teachers attended a reception at the University. They were welcomed by the Vice-Chancellor, were shown experiments and exhibits in various departments, and listened to an address by Prof. A. J. Grant. During the evening there was a conversazione, at which addresses were given by Prof. Kendall and by Prof. Hamilton Thompson. The exhibits in the Fuel Department were comprehensive and highly interesting.

On Thursday, Dec. 18, the Lord Mayor of Leeds, members of the Council and Education Committee, and Magistrates of the City of Leeds visited the University; and on Friday a visit was paid by the County and County Borough Councils of Yorkshire. Saturday was what was termed "open day"; the various departments of the University being open to the public for inspection.

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It has been impossible, in this brief outline of what have been the most brilliant functions in the annals of the University of Leeds, to present more than a general idea of the proceedings and give some impression of the strength and ideals of an institution which has in the past served the gas industry so well—a service which, it is hoped, will be extended and further appreciated in the future.

## MUTUAL ASSISTANCE BETWEEN GAS UNDERTAKINGS.

### The South Metropolitan Company's Plan.

IN our editorial columns last week, mention was made of a notice given by the South Metropolitan Gas Company of a Bill to allow of agreements between them and other gas undertakings for mutual assistance. The Bill itself is now to hand.

In the preamble reminder is given that, by the Company's Act of 1920, they were authorized to supply gas in bulk to any company authorized to supply under parliamentary powers in any district adjacent to the limits of supply of the Company, and subject as therein mentioned to amalgamate their undertaking with, or to purchase, any undertaking for the supply of gas in any limits of supply which adjoin or are contiguous to those of the Company. It is also pointed out that the Company have for many years maintained premises and an organization at Newcastle-upon-Tyne for the purchase of coal, and a fleet of steamers for the conveyance thereof from Newcastle to London, in order to purchase and convey it as cheaply as possible. They have also maintained laboratories and other works for, and a staff engaged in, scientific research in relation to coal and residual products obtainable in the manufacture of gas, and the disposal to the best advantage of those products. The price of the gas supplied by the Company has for many years been the lowest of the three large Metropolitan Gas Companies; and the resources of the Company have formed a large element in enabling them to sell at such low price. It is now submitted that it would be of public advantage and tend to the reduction of the price of gas, if provision were made whereby such facilities, organizations, and advantages as the Company have provided, or may hereafter provide, could be made available for the benefit of any company to which the Company may from time to time be authorized to supply gas, or with which the Company may from time to time be authorized to amalgamate. It is therefore expedient that the Company and any such company should be empowered to enter into and carry out agreements in relation to the provision or the enjoyment of, or the participation in, the benefits of such facilities, organizations, or advantages.

The clauses provide that the Company and any company with whom they are, or may be, authorized to amalgamate or whose undertaking they are authorized to purchase, or to whom they are empowered to afford a supply of gas in bulk may, with the approval of the Board of Trade, enter into and carry into effect any agreement with each other in regard to all or any of the following purposes:

- The use, or the participation in the use of, or in any benefit of, any premises, plant, organization, operations, or other facilities belonging to, enjoyed by, carried on, or provided wholly or partly by the Company, in relation to the manufacture and sale of gas or products arising in such manufacture or the provision of any such facilities.
- The purchase, transport, landing, and the delivery of coal, and the despatch or disposal of residual products arising in the manufacture of gas.
- The carrying-out of scientific research in relation to coal and residual products.
- The extension, provision, maintenance, or use of any laboratories and apparatus for such research, and the use or benefit of any results or discoveries arising thereby.
- The provision of any buildings, work, or plants for the purpose of enabling either party to such agreement to give a supply of gas in bulk to the other of them.
- The provision of moneys for carrying into effect any such agreement.
- Any matters or things incidental to or connected with any of the purposes aforesaid.

Except in so far as is provided, any company entering into any such agreement is to remain and be subject to all and the same obligations and liabilities to all persons not parties to any such agreement as they would have been subject to if such agreement had not been entered into. When proposals are being submitted to the Board of Trade, the particulars are to be forwarded to the London County Council, who are to be entitled to make representations to, and be heard by the Board thereon before the agreement is approved by them.

Proceeding, it is seen that the Company and any company with whom they are authorized to enter into agreements under the foregoing provisions may enter into, and carry into effect, agreements for the use of the Company's landing-stage at East Greenwich, and any conveniences or services afforded by the Company thereat, and any other matters incidental to, or necessary for, the operations of such company as a gas company.

Any agreement entered into under these provisions may provide that any consideration being in the nature of a capital payment, and payable by either of the parties thereto to the other, may be satisfied wholly or in part by the allotment of shares or stock in the capital of the company from whom such consideration is due, or by debentures or debenture stock as shall be agreed, or partly by the one and partly the other of such modes; and thereupon it will be lawful for either of the parties to issue the shares, stock, or debentures or debenture stock accordingly, all of which shall be deemed to be fully paid up.

The next clause provides that the Directors of the Company may at any time appoint any person being a director of any company which has entered into an agreement with them under this Act to be a Director of the Company; and for such purpose the number of Directors may be increased by not more than three as is necessary, with a proportionate increase in remuneration. But no person is to be appointed a Director unless he has the qualification prescribed by Section 2 of the South Metropolitan Gas Act, 1897. It is also provided that in any case in which the Company and any other company have entered into an agreement authorized by this Act, the Company may effect changes of stock or securities with proprietors of stock, shares, or securities of such other company, or may lend money to such other company, to an extent as, in the opinion of the directors of that company, will be of advantage for furthering the purposes of the agreement including reduction in the price of gas.

Any scheme for amalgamation or purchase as is referred to in Section 37 of the South Metropolitan Gas Act, 1920, may provide for compensation to directors of any company or to auditors, officers, or servants of any company retiring or suffering loss of employment or emoluments on, or by reason or in consequence of, any such amalgamation or purchase, and as to the manner in which, or the company by which, any such compensation or any part thereof shall be borne.

### "Journal" Diary and Gas Calendar.

Owing to the printing not being quite completed, the execution of orders received for copies of the "Diary and Gas Calendar" will be delayed a little. Prompt despatch will follow deliveries from the binders.

### A New Book on Gas-Meters.

Messrs. Crosby Lockwood and Son are responsible for the publication, as one of their "Trade Manuals," of a book on "Gas Meters" written by A. T. Gilbert, the Distribution Superintendent of the Nuneaton Gas Company. This little volume, which explains the construction, fixing, use, inspection, and maintenance of meters, is published at 7s. 6d. net. Copies may be obtained direct from the "JOURNAL" offices.

By permission of the Smoke Abatement League, there has been reprinted a lecture entitled "Some Notes on Recent Developments in Steam Generation," which Major W. Gregson delivered last month at the Manchester Smoke Abatement Exhibition. In connection with waste-heat recovery processes, he drew special attention to the Spencer-Bonecourt fire-tube waste-heat boiler operating at high gas velocities. There was a small Spencer-Bonecourt gas-fired boiler working in the exhibition.

## GLOVER-WEST CONTRACTS.

**A Big Installation of Verticals for Nine Elms.**

We learn that the Gas Light and Coke Company have decided to carry out considerable extension of their carbonizing and other plant at the Nine Elms Gas-Works, involving the expenditure of a million-and-a-half of money. A contract has been placed with West's Gas Improvement Company, of Manchester, for an installation of Glover-West vertical retorts, with coal and coke handling plant, of a daily capacity of 7 million c.ft.

The retorts are to be of their 40-in. "New Model," and the installation will be fully equipped with all recent improvements, including Spencer-Bonecourt waste-heat boilers.

West's Gas Improvement Company have also secured recently the contract for the new carbonizing plant for the Primitiva Gas Company of Buenos Aires, with a capacity of 3½ million c.ft. per day.

## TABULATING THE RESULTS OF HEAT ENGINE AND BOILER TRIALS.

**A Discussion at the Institution of Civil Engineers.**

In the "JOURNAL" for July 9, p. 250, a short account was given of a meeting held at the Institution of Civil Engineers on July 3, when Capt. H. Riall Sankey, C.B., C.B.E., outlined the general scope and objects of the work of the Committee on Heat Engines and Boiler Trials. This Committee, which is composed of four members each of the Institution of Civil Engineers, the Institution of Mechanical Engineers, the Institution of Naval Architects, the Institute of Marine Engineers, the North-East Coast Institution of Engineers and Shipbuilders, the Institution of Engineers and Shipbuilders in Scotland, the Institute of Chemistry of Great Britain and Ireland, the Institution of Gas Engineers, the British Electrical and Allied Manufacturers' Association, and the British Engineers Association, appreciating the fact that the present standard of comparison needed development to render it applicable to re-heating and feed-heating cycles which have been adopted comparatively recently, asked Capt. Sankey to introduce a discussion on the subject at a joint meeting held on Dec. 11.

In 1896, said Capt. Sankey, the Institution of Civil Engineers appointed a Committee, under the Chairmanship of Sir Alexander Kennedy, to determine a standard of comparison for steam engines. The standard proposed was the Rankine cycle, which was subsequently adopted. Since that time the practice of heating the feed water by live steam abstracted from the engine during expansion (known as "bleeding") had been developed, resulting in considerable economy; but to this case the Rankine cycle did not apply. The practice was also adopted of re-heating the steam after a partial expansion—a process which can be repeated once or more, after which the steam is expanded to the back pressure. It would be stretching the definition to apply it to this case. Further, these feed-heating and re-heating cycles could be combined; and the question arose, Could a standard of comparison be defined which would meet all cases? Consequently, the definition of the Rankine cycle had been amplified and amended to accord with modern developments.

### NEW DEFINITION OF RANKINE CYCLE.

It is assumed that all the component parts of the steam plant are perfect, and that there are no losses due to initial condensation, leakage, radiation, or conduction, and that there is no clearance in the cylinder. The feed-water required is taken into the boiler at the exhaust temperature, and its temperature is gradually raised until that corresponding to saturated steam is reached. Steam is then formed at constant pressure until dry saturated steam is produced, after which, if the steam is to be superheated, heat is added at constant pressure and at increasing temperature, until the required temperature of superheat is reached. The steam is introduced into the cylinder at constant pressure, displacing the piston, and performing external work equal to the absolute pressure multiplied by the volume swept through by the piston up to the point of cut-off. Beyond that point expansion takes place adiabatically, doing work until any desired pressure is reached, when the steam is re-heated at constant pressure to any desired temperature, whence adiabatic expansion takes place. Such re-heating process can be repeated as often as desired. Finally, the steam is expanded adiabatically until the temperature of saturation corresponding to the boiler pressure is met. From this point *either* adiabatic expansion continues doing work until the pressure in the cylinder is equal to the back pressure against which the engine is working, *or* the steam is expanded so that a portion of the heat is transferred to the feed-water—in such a manner that at every temperature the amount of heat so transferred is equal to the increase in water-heat at that temperature—until the pressure in the cylinder is equal to the back pressure against which the engine is working. The steam is then completely exhausted from the cylinder at constant pressure corresponding with the lower limit of temperature; work being done on the steam by the engine during exhaust, equal to the absolute back pressure multiplied by the total volume swept through by the piston. The steam is thus removed from the cylinder, and the cycle is complete. In practice, stated Capt. Sankey, the following main cases occurred, resulting from the omission of one or more of the factors of the comprehensive definition:

1. Saturated steam with simple adiabatic expansion to the back pressure.
2. Superheated steam with simple adiabatic expansion to the back pressure.
3. Superheated steam with one or more re-heats with final adiabatic expansion to the back pressure.
4. Saturated or superheated steam with feed-heating expansion to the back pressure.
5. Superheated steam with one or more re-heats and final feed-heating expansion to the back pressure.

The thermal efficiency of any heat engine was defined as the ratio of the heat utilized as work to the heat supplied; and in the case of the standard of comparison defined, these two heat quantities could be determined by formulæ, but even in the simplest cases these formulæ were cumbersome and the calculations lengthy. For practical purposes, the thermal efficiency could be obtained approximately by the use of the Mollier chart, while if greater accuracy was desired, calculations could be made in conjunction with steam tables. In order to ensure the correct sequence being followed, a rough sketch of the $\theta\ \phi$ kind was advisable.

For the most part the discussion dealt with the difficulties of defining a standard which would meet all cases in turbine practice, and it was suggested that the new definition of the Rankine cycle was not sufficiently comprehensive, and that the portion of the paper dealing with feed heating should be expanded. Thermal efficiencies of turbines, when based on the Rankine cycle, were apt to be misleading. Perhaps, said one speaker, it would be advisable to obtain the average adiabatic heat drop, and use this as a basis for calculating the ideal efficiency of a turbine. It was pointed out that in calculating efficiencies the same steam tables should always be used; and Capt. Sankey said that the Committee had decided to adopt Callender's enlarged tables as the standard.

## STATUTORY COMPANIES AND THE COMPANIES CLAUSES CONSOLIDATION ACTS.*

**Reviewed by a Barrister-at-Law.**

In reviewing this excellent little book, which has just been issued, one cannot do better than quote what the author, Mr. R. J. Sutcliffe, states at the outset of his preface:

> **The Companies Clauses Acts, 1845 to 1889, are to be found set out in some books upon Railways, Gas, and Water, and other subjects; but the author believes that they and the cases decided thereunder have not hitherto been collected and dealt with in handy form, and apart from some other and much larger subject.**

What Mr. Sutcliffe has thus stated confirms a view held generally, it is believed, by those responsible for the administration of statutory companies which are regulated by the Companies Clauses Acts. To have at one's disposal in a volume of less than 200 pages the whole of these Acts, with full references to the case law, and arranged in a convenient manner, well printed, is a great convenience. Mr. Sutcliffe has noted the Acts very carefully and thoroughly, and has, in addition, included those sections of the Companies (Consolidation) Act, 1908, which relate to statutory companies.

It will be found that this volume contains much information of use to directors and officials of statutory companies; and the notes, without losing their validity as accurate statements of the effect of decisions, are phrased in clear and practical language. A word of praise is due to the general arrangement, type, and get-up of the book; and the only criticism one would be disposed to make is that, while the index is adequate, the question of its expansion might be considered before the inevitable next edition is published.

* "Statutory Companies and the Companies Clauses Consolidation Acts," by R. J. Sutcliffe, of the Inner Temple, Barrister-at-Law. London: Messrs. Stevens & Sons, Ltd.; 1924. Price, 7s. 6d. net.

**Sheffield Illumination Society.**—The Sheffield Illumination Society has been formed (*a*) to arrange visits to works, &c.; (*b*) to devise means for helping and extending the technical knowledge of members; (*c*) the submission of papers by members and others, and discussion thereon; and (*d*) the delivery of lectures. The formation of the Society was suggested and assisted by Mr. J. F. Colquhoun (the new Chief of the Sheffield Corporation Lighting Department), who has already founded a similar Society in Glasgow, which is now an influential and virile body, doing very good work. An interesting syllabus has been arranged for 1925; and the first meeting will be held on Jan. 14, when Mr. Colquhoun will deal with the "History of Public Lighting and Methods of Measurement." The Hon. Secretary of the new Society (which we wish every success) is Mr. E. Marrison, of the Lighting Department, No. 42, Corporation Street, Sheffield.

# MIDLAND JUNIOR GAS ASSOCIATION.

A meeting of the Association in the Birmingham Council House on Dec. 12 was presided over by Mr. HARRY CLARK.

Mr. H. R. HEMS (the Hon. Secretary) attended, after an absence from the previous two meetings owing to illness; and he received a cordial welcome from the President.

To Mr. Summerton, who has acted as Secretary during Mr. Hems's illness, a hearty vote of thanks was passed, on the motion of Mr. J. H. GEE, B.Sc. (Senior Vice-President).

The PRESIDENT, in calling upon Mr. Botwood to give his paper on "Arterial Supplies," observed that one of the biggest problems in the gas industry to-day was to deal effectively with the Sunday cooking load; and with the steady growth in the use of gas cooking stoves, it would appear that the summer domestic cooking load would be practically equivalent to the winter load.

## ARTERIAL SUPPLIES.

By B. F. BOTWOOD, of the Birmingham Corporation Distribution Department.

On May 23, 1914, I had the pleasure of reading a paper before you. In that, I dealt with the laying of high-pressure mains, the reinforcement of outlying districts by the installation of governors and high-pressure supplies, and the standardization of low-pressure castings. Conditions in those days were normal, and the distributing engineer was able, with a fair amount of accuracy, to forecast the demands of a district. Such was the case in Birmingham, and the steps which were being taken to maintain even pressures were adequate. Then came the war, with its huge industrial consumption, and the springing-up of factories and temporary homes for the army of workers. Now comes the aftermath. The housing question in Birmingham has called for the concentrated attention of the authorities, and the outskirts of the city have developed wherever suitable sites have presented themselves. This growth has been most manifest on the south, south-east, north-east, and south-west of the city; and up to the present time a total of 5903 municipally-owned houses have been built. It is difficult to average an hourly consumption for mass houses of this nature, and in a variety of districts; but allowing 20 to 25 c.ft. per hour, this increase alone accounts for approximately 150,000 c.ft. per hour, or somewhere about one-ninth of the output of the Saltley and Nechells Works for a noon hour in October. In addition to this, there are large estates in all parts of the outlying districts which have been constructed by private venture, and of which I have taken no account.

The district governor houses have stood us in good stead to meet the demand, and have enabled us to lengthen our trunk mains and still, within reason, to maintain our pressure line. The time has arrived, however, when further reinforcement is necessary. To take one instance only, during 1913 and the early part of 1914 we laid down the Harborne governor house at Hart's Green.

In the January of 1913, pressures were taken at various points on the district which would be affected, and it was found that such an installation would enable us to increase the district pressure by approximately 25-10ths. The improvement was carried out, and justified our expectation. The high-pressure supply for the governor house was obtained from the existing 12-in. diameter high-pressure main in Pershore Road. The 12-in. main was laid in 1910 to supply King's Norton governor house, the first of its type in Birmingham. This installation was fully described by Mr. James Hewett, our Distributing Engineer, in a paper read before you on Jan. 27, 1912. The supply to Harborne governor house was taken-off at a point approximately 2600 yards from the junction of the 12-in. with the 24-in. trunk main from the Windsor Street Works. The laying of this main, which was a 9-in. diameter wrought-iron one, 3¼ miles in length, with oxy-acetylene welded joints, has already been described by me in my paper already referred to.

Towards the end of 1914, a 12-in. diameter wrought-iron main with oxy-acetylene welded joints was laid to supply the Wake Green governor house. This was taken from the 12-in. diameter cast-iron main at a point 667 yards further south than the Harborne branch.

Consumption has been continually growing in all the areas affected by the three governor houses, and we have now arrived at that point where Harborne cannot maintain its pressure to district low-pressure mains. The capacity is there, but the 12-in. main from its junction with the 24-in. high-pressure trunk main to the point with the Harborne 9-in. branch is unable to cope with the demands of the three governor houses.

Normally this main should carry gas at 14 to 15 lbs. per sq. in.; but the present conditions are such, we calculate, that about 7 lbs., or one-half the pressure, is being lost in the initial portion of the 12-in. cast-iron main between the 24-in. trunk and the junction with the Harborne branch. The obvious remedy is to eliminate or reduce this loss by the laying of a second high-pressure main from the 24-in. trunk, and feed into the 12-in. main which is at present supplying the Wake Green governor house. This will entail the laying of about 3300 yards of high-pressure main, probably 16 in. in dia.; but it will enable us to maintain pressures in the Harborne district, and will also materially assist the other two governor houses. In the north of the area, conditions have not been satisfactory, and it is probable that a fan plant will be installed in the near future. The consumption at present in this area is about 35,000 c.ft. per hour, and the projected installation will raise the pressure by 27 in. (water column), and will be of such a capacity as to cope with the demand until it has trebled.

The construction of the new holders on the Washwood Heath site is progressing apace, and next summer will see the booster mains in action. The main outlet has been laid, but at present is used as a low-pressure supply.

The main from the site of the new governor house runs across a portion of low-lying land which formed part of the Birmingham sewage farm. The existing main is of cast iron, 36 in. in diameter, with open lead joints, and, owing to the varying levels of the ground, is carried on timber piles for some portion of its length. This main will, as a booster main, ultimately feed to district governors, and will reinforce supplies in the north, north-east, and south-east of the area of supply.

These are immediate projects, and there is no doubt that other mains will in the near future be laid from this scheme to balance pressures in adjacent districts. The lay-out of an arterial system to-day is a matter requiring the most careful consideration, for, while there may be a sudden demand for bulk supply many miles from one works, this demand may rapidly develop in such a direction that its main load might well be met from another trunk system. It behoves the engineer who is planning such a lay-out to make the fullest inquiries as to road development, both near his point of demand and at points reasonably remote from it, before pledging himself to one definite scheme of supply. Here is a great advantage in the booster main. Laid as a temporary low-pressure main, but isolated from all mains *en route*, and simply discharging its gas through a temporary connection to its immediate demand, it may with ease at a later date be connected at its terminal with a district governor, the outlet of which is discharging into the existing low-pressure system, and then be used for boosting.

The lay-out of supplies for a new estate is a question which naturally must be judged entirely on its merits, but, in these days of expensive road construction, cross-services should, wherever possible, be avoided, and service mains laid up each footpath. This is the practice generally in Birmingham, for it not only makes access easy in case of repair, but considerably lessens the cost of service laying and maintenance.

For the present, no figures can be given as to pressures which may be maintained with the assistance of the booster mains, but good results have already been given by the booster mains being used as additional low-pressure supplies. It will be interesting to compare, in perhaps twelve months' time, the improved conditions with those of to-day. Figures, pressures, and definite data will then be available.

To revert to the laying of high-pressure mains, in my paper of 1914 I described the laying of an 8-in. wrought-iron main with taper screwed joints. Some doubt was expressed at the time as to the advisability of putting-in screwed joints. We have been justified, however, in the choice; for, though the thoroughfare in which the main was laid was subjected to exceedingly heavy traffic during the war, we have not had the slightest trouble. The same may be said of the oxy-acetylene welded joint. In fact, each type of joint, as laid, has maintained its soundness, with the exception of the open lead joints. These have been a source of trouble, and a great many have required re-setting.

### DAMAGE BY ELECTROLYSIS.

The 12-in. diameter mild steel main which was laid in 1914-15 from Pershore Road to the Wake Green governor house has been seriously damaged by electrolytic action. This main has oxy-acetylene welded joints, and the pipes were double-wrapped with brattice, which was well coated with bitumen. The first notification of the trouble was a reported escape in the Moseley Road. At this point the main is, owing to various obstructions, laid at a depth of 5 ft. 6 in. under the footpath. On opening-down, it was found that gas was escaping in large quantities from a pitted hole on the underside of the main.

The main was, as a temporary measure, repaired at this point with wrought-iron clips, bedded on to a sheet lead and graphite paste joint, and the main further stripped for examination. The surface of the main in the vicinity of the damage was found to be deeply pitted, and a thorough examination was decided upon. Tests were taken by Mr. Lamb (the Electrical Engineer to the Gas Department), who found the main at this point positive to the adjacent tram rail. About 100 ft. north of this point the main crosses under a double tram track, runs parallel with it for that distance, and then turns eastwards.

I do not propose to deal with the electrical side of this question here, but various tests were taken, and the point of maximum negative potential found. Portions of the main were stripped, and I made about 150 observations of damage. This, roughly, extends for a distance of 2600 ft., and this portion of the main will have to be re-laid. For a great portion of this length the main is laid in a saturated clay, but I did not observe any signs of ordinary corrosion. The types of damage roughly fall into five classes.

1.—Large patches with pittings varying from 1-16 in. deep to absolute penetration of the metal. In this case, the walls of the main are 5 16 in. thick.

2.—Extensive patches of small shallow pittings intermingled with large ragged irregular cavities. These are generally about ⅛ in. to $\frac{5}{32}$ in. in depth.

3.—Large patches of slightly corroded metal, with a scaly appearance. In many cases these areas extend for over 12 sq. in.

4.—Small isolated groups of extremely shallow pits.

5.—Isolated pits, truly circular in form, of various depths.

I have taken plaster and sulphur casts of some of these types, and these may be looked upon as typical of the whole.

The bitumen-impregnated brattice appears to assist materially in the repulsion of the current, and I noticed particularly that, where a bad patch of pitting occurred, the surface of the brattice next to the main was coated with rust, and that in most of these cases the fabric of the brattice had not been perfectly filled with bitumen. It appears to me an important point that, in wrapped tubes, not only should the surface of the pipe be well coated before wrapping, but extreme care should be taken that the interstices of the brattice are absolutely filled with solution. Care should also be taken that the covering is not damaged in laying. Should this occur, the portions should be coated and re-wrapped.

I carefully examined the surfaces of cast-iron syphons, valves, &c., in the run of the main, and only in one instance did I find any pitting or damage to these, and in this instance it was extremely slight. The pitting in the main is general, but bad places occur at the back of sockets in many cases. It was noticeable that in many the damage extended in the form of a half bracelet about 1 in. wide round the top or bottom half of the pipe, the other portion being left untouched.

As I have previously stated, tests are still being carried out; and pits have been built in various places, and permanent leads connected to the main. This allows for an electrical test to be made without the expense and trouble of opening-up a roadway, and enables the engineer to obtain a record at any time. As to the remedy, this is, indeed, a vexed question; but it is obvious that the greater part of the cure must come from outside the gas industry.

The Mond Gas Company, of Dudley Port, have suffered for many years from electrolysis in their supply system; and by the courtesy of Mr. Caddick (the Secretary to the Company) I was enabled to study portions of damaged mains, and some of the steps taken to remedy the trouble. In the Mond gas area a great deal of the damage is undoubtedly caused by works with electric welding plants, where the return current is carried direct to earth. The method adopted by the Mond people is to bond each joint with a pure copper strip $\frac{1}{2}$ in. by $\frac{1}{16}$ in. in section, and, at various intervals, carry the current in the main to earth through wrought-iron earth bars. These are wrought-iron flats $2\frac{1}{2}$ in. by $\frac{3}{8}$ in., and about 4 ft. long. The bars are placed in good electrical contact with the main, and earthed in coke dust or some other medium. This method undoubtedly eliminates most of the damage to the main itself.

It should be remembered, however, that the Mond joints are of the yarn-and-lead type, and do not give the same conductivity as a welded joint. It would seem in the latter type that bonding is scarcely a necessity. One earth bar which I examined was placed on a main at Ockers Hill in October, 1918, and taken out during February, 1923. The upper part of the bar exhibited pittings of the same nature as experienced by us in the 12-in. main, and about 2 ft. of the lower portion of the bar had been eaten away. Bitumen has been found by the Mond Company to be a fair insulator; and in one case in Birmingham, where a 6-in. main was attacked and a portion had to be relaid, we enclosed the new main in a wooden trough which was filled with bitumen. This, obviously, would be far too expensive a method for long runs of large diameter main.

This concludes my remarks. I regret that my paper does not contain more definite details, but in excuse I would point out that the work in the distribution side of an undertaking such as the Birmingham Gas Department leaves little leisure time in which to prepare a detailed paper.

### Discussion.

The PRESIDENT, speaking of electrolysis, inquired which pipes would best withstand mischief—wrought or cast iron. In the event of the district governors getting out of order, what means had they for ascertaining the fact? He produced examples showing the effect of fusion.

Mr. GEE, in moving a vote of thanks to Mr. Botwood, asked what was the actual maximum voltage found where the trouble of electrolysis arose.

The resolution was seconded by Mr. A. KENDRICK (Birmingham), who commented upon the unique experience Mr. Botwood had had with regard to fusion and electrolysis.

Mr. GEE asked for an approximate figure, over twenty years, of the percentage of mains which had to be renewed because of electrolysis and fusion. He had recently read the proceedings of the American Gas Association, and from these it would appear that over twenty years, in one town, it only became necessary to renew one-third of one per cent. of the mileage, and about half of this was due to electrolysis.

Mr. W. L. S. SPINKS (Birmingham) inquired if there had been any case of bitumen running where there was electrolytic action. What was the experience of the Water Department with regard to their cast-iron mains?

Mr. S. W. SIMMONS (Dudley) asked for information as to which class of pipe joints acted most effectively. What led to the adoption of a screwed wrought-iron main? It seemed to him that gas departments were suffering to-day from the extreme economy of previous managements. There had been too little disposition to take a long view of things; consequently supply facilities became inadequate in too short a time.

Mr. W. B. COBB (Birmingham) asked as to the efficacy of the earthing as practised by the Mond Gas Company.

Mr. F. WESTWICK (Birmingham) spoke of the congestion of services of various kinds below footpaths, and asked what had been the Birmingham experience in transferring many mains from the roads to the footways. It appeared to him that much fusion might arise.

Mr. BOTWOOD said experience in Birmingham showed that electrolysis did not attack a cast-iron main with the same ease as it did a wrought-iron or a mild-steel main. In a district where there was a big possibility of such trouble, he favoured a cast-iron pipe with some special type of flexible joint. The governors could be worked in parallel and in series. The screw-jointed main with high-pressure gas was put down at a period when the department were more or less experimenting, but the experiment was justified. Correct laying was most important, as were also the use of proper materials and adequate inspection to ensure that the threads of the screws were thoroughly satisfactory. Electrolysis more frequently occurred in acid sub-soil. Sweating, due to differences of temperature, was frequently to be noted where there was electric action; and it would appear that sweating conduced to electric conductivity, and also assisted corrosion. There was no doubt that, when electric action had started, such continued action hastened ordinary corrosion. He had not noticed that electric action caused any running of bitumen, though he had observed a deterioration in the "life" of the covering material. He had no information as to electric action on water mains; but where such action did occur, he understood the pitting was generally inside the main, and not on the outside. The conductivity would probably be less with a cast-iron main than with one of mild steel. With the higher pressures, he would cut the open lead joint right out. Tapered screwed joints were quite effective if there were thorough supervision. The oxy-acetylene joint, properly made, was quite good; but defects might easily occur if cold metal were deposited in the weld. There was no more risk, in these days of precautionary measures, of fusion or electrolysis in having the services under the footpath than under the roadway.

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### Visit to a Tar Distillation Works.

Members of the Association paid a most interesting and instructive visit last Saturday to the Oldbury Works of the Midland Tar Distillers, Ltd., over which they were conducted by Mr. J. C. Mann (Managing-Director), Mr. W. T. Collis (Works Manager), and Messrs. R. R. Robinson, J. Mann, W. A. Warner, and J. J. Turner (members of the staff).

After a tour of inspection, during which the members saw plant and processes that were explained in a private pamphlet, the visitors were entertained at tea by the Directors.

Mr. H. CLARK (President), proposing a vote of thanks to those who had conducted them round the works, said it had been a most interesting and instructive afternoon. The works and processes had been a revelation.

The motion was seconded by Mr. J. H. GEE (Senior Vice-President), and supported by Mr. JOSEPH POULSON (Oldbury).

Mr. J. C. MANN, in reply, said it was always a pleasure to show people round the works, and particularly people connected with the gas industry. He referred to the co-operation which existed in the gas industry, and thought that the progress made during the last thirty years was largely accounted for by the free intercourse between members through the various Associations, &c. Years ago, tar distilling was more or less a closed industry; but he was pleased to say that the spirit of co-operation was spreading, and he felt sure this would make for the good of the industry. The works at Oldbury were established in 1869, and in 1923 they were merged into the Midland Tar Distillers, Ltd., who had ten works, with three more working in co-operation, so that it was a big concern. The grouping of the works made for economy in all ways, particularly as regards transport.

Mr. W. T. COLLIS said he had always envied members of the gas industry; they seemed to be so free to discuss their problems, through the medium of their Press and their various Associations. He had derived much pleasure from showing the party round the works.

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## Standardization.

An address on standardization was given to the South Wales Institute of Engineers, when they met recently in Cardiff, by Mr. C. Le Maistre, C.B.E., who pointed out to them that what standardization really meant was the elimination of waste through simplified practice in manufacture. Owing to their organization, the British Engineering Standards Association could carry out this work of simplification for any branch of industry considerably cheaper than that branch could, with the same efficiency, do it for themselves. What the Association did was to carry out the considered views of representative committees of the industries concerned. The Association did not undertake any standardization unless they were invited to do so by some representative body, and even then they did not commence until they had had a conference of all concerned, so that they could be assured of a unanimous desire that the work should go forward, and that it was to fulfil a recognized want. As a matter of fact, the work of the Association was growing at a great pace. Formed in 1901 with only one committee, there were now more than 440 committees, and well over 2000 members. The only thing the Executive did was to see that the central co-ordinating influence was brought to bear on the methods employed for carrying out the work. They had no written rules; they had preferred to let their work grow on the same lines as the British Constitution. Many a time they had been thankful that this was the case, because they had been able to adjust themselves to the needs of industry.

## SCOTTISH JUNIOR GAS ASSOCIATION.

### (EASTERN DISTRICT.)

#### Visit to Plean Coke Ovens.

There was a visit of the Association to the Plean Coke Ovens, Stirling, on Saturday, the 13th inst., a fair number of members being present. On arrival they were met by Mr. Daniel Wright (Coke-Oven Manager), Mr. Jas. Robson (Chief Chemist), and other members of the staff, who conducted them on their tour of inspection.

The coal found in the Plean District is one of the best coking coals in Scotland, and is chiefly used for this purpose. Immediately it is raised to the surface, it is crushed to ¼-in. and under, after which it is washed until the ash content is reduced to approximately 5·5 p.ct. It is then elevated to the storage ark, where it is allowed to drain until the moisture content is reduced to about 10 p.ct. Hopper bogies convey the coal in this condition to the ovens.

The ovens are of the vertical flue type, 33 ft. in length, 7 ft. high, 1 ft. 7 in. in width at the front, and 1 ft. 5 in. in width at the back. The coal is charged at three points on the top of the oven, and is levelled by hand. When charged, the oven is immediately sealed, and the coal subjected to a temperature of approximately 2000° Fahr. The installation is capable of carbonizing 325 tons of coal per 24 hours, the coke produced being extensivsly used for foundry purposes. The gas evolved passes through the hydraulic main, which is of the open type and carries a seal of weak ammoniacal liquor. A Waller exhauster draws the gas through atmospheric condensers, after which it is forced through a tar extractor, a second set of condensers, an ammonia rotary washer, and the benzole rotary washer. It is then passed on to the cellar, where it is distributed to heat the oven walls. Finally the waste gas is used to generate steam.

Considerable interest was shown in the crude and refined benzole plants. The benzolized oil from the rotary washer is pumped through a first and second heater, and thence to the still, where it is met by steam. It continues through the still to a separator and cooling coil, and returns to the washer. The vapour from the still is cooled by a water-cooled worm, passed through a separator, and then goes to a storage tank. The crude benzole is passed on to a second still for further refinement, after which it is washed and finally distilled.

The raw tar from all sources is dealt with in a Holmes continuous distillation plant, producing dehydrated tar for road purposes; and the ammoniacal liquor from the rotary washer is passed to a sulphate plant of 4 tons per 24 hours capacity.

Following the inspection, the visitors were entertained at tea on the invitation of the Plean Colliery Company, Ltd.

Mr. DANIEL WRIGHT, on behalf of the Company, extended a hearty welcome to the members, expressing the hope that their inspection of the plant had been instructive and enjoyable. He mentioned that the pioneer work was carried out as far back as 1894 by Mr. Thornycroft, and that the plant had been kept up to date since then. It was efficient, and their products took first place in the market.

Mr. ALAN CLARK (Perth), Vice-President, in the unavoidable absence of Mr. R. L. Laing (the President), replied on behalf of the Association. Few, if any, of the members had, he said, been to a coke-oven plant before, and he was confident the visit had been much appreciated by all. Their first impression was the marked similarity between the process and horizontal retort carbonization. They were greatly indebted to Mr. Wright and Mr. Robson for the way in which they had explained the various processes. The Company seemed to have no difficulty in preparing tar to the Road Board Specification. Mr. Clark spoke at some length of the difficulties they had had in Perth since the introduction of vertical retorts. Perth, he thought, claimed to be the pioneer gas-works in Scotland to distil pitch. With horizontal tar they had no difficulty in keeping-up to specification; but during the first year after the installation of vertical retorts, they had great trouble in doing so. No. 2 tar was certainly obtained by extracting so much of the heavy oils, and then adding a certain percentage of middle oils to make-up for those lost in the process. A great characteristic of refined vertical tar (No. 2) was that at normal temperatures it was nearly solid, and this presented great difficulties to road surveyors. This year being very wet, caused a glut in refined tar for road purposes, and extra storage had to be provided. They had just started-up a "Wikner" dehydrating plant (by Messrs. Holmes, of Huddersfield) of 40 tons a day capacity. In connection with this scheme, a bitumen melting and mixing plant was in view, there being a good outlet for this material in the district. He proposed a hearty vote of thanks to the Company, and to Messrs. Wright and Robson, for the visit enjoyed that afternoon.

Mr. E. L. FARQUHAR (Lower Largo), the Hon. Secretary, associated himself with the previous speaker, and added his personal thanks for the courtesy which had been afforded him in arranging details of the visit. He was particularly interested in the devices employed at the coke ovens for the conservation of waste heat, and expressed the opinion that they were ahead of many gas-works in this respect.

Messrs. SMART (Dunfermline) and BISHOP (Newtongrange) asked questions regarding benzole, sulphate of ammonia, &c., which were answered by Mr. WRIGHT.

Before the close, Mr. CLARK referred in suitable terms to the promotion of one of their most energetic members and a Past-President—Mr. Walter Dearden (Dunfermline), who has been appointed Engineer and Manager at Johnstone, recently vacated by Mr. James Dickson, now of Dundee. The Association, he said, wished him every success in his new sphere.

## YORKSHIRE JUNIOR GAS ASSOCIATION.

#### Visit to Leeds University.

According to the session's programme of the Association, the December meeting should have been devoted to hearing a paper by Mr. J. W. Wood. The date happened, however, to coincide with the "open day" bringing to a close the "Coming of Age Celebration Week" of the Leeds University, so, by arrangement between the Council of the Association and Mr. Wood, the paper was postponed to a later meeting, and the afternoon was given-over to a comprehensive visit to the various departments of the vast University.

The day was one on which the public were invited to inspect the University, and there was a very large attendance. There was no question of a private tour of the University, conducted in small groups, each under its own guide, as in the case of ordinary works and institutional visits. The members of the Association, according to instructions given on the notice of meeting, assembled outside the main entrance in College Road. For a few brief moments, the President (Mr. E. Gillett, of Bradford) drew them aside from the various gatherings of other societies and people passing into the buildings, and in respectful silence, with bared heads, the members passed a vote of condolence with the relatives of the late Mr. C. D. Cawthra, Deputy Gas Engineer at Halifax, and a Past-President of the Association. This was the whole of the formal business of the day. Eight new members, who in the ordinary course would have been formally welcomed by the President, had to be content with initiation in the very informal way of mingling with their new fellow members, and taking their share of the enthralling interest of the afternoon. Mr. F. A. C. Pykett, of Halifax (the Hon. Secretary of the Association), was unfortunately absent, owing to an attack of influenza.

The members formed themselves into small parties, according to preferences in choice of route through the buildings. The departments were separated into three main sections, specified on a neatly-arranged printed programme for the day, issued to all visitors, and grouped under yellow, red, and blue routes. Visitors, studying the programme, selected a yellow, red, or blue ticket, and followed the route appertaining to that ticket, as indicated by big arrow cards of corresponding colour. Students of the University, as stewards, were stationed at frequent points to be of help to visitors in any way possible. In departments where machinery and plant could conveniently be working, the authorities of the University had arranged that this should be so; and in chemistry, physics, and other departments experiments were in progress, tutors and students alike being ready always to answer questions asked.

Most of the members of the Association selected first the red route, comprising chemistry, geology, fuel and mining, and textiles. Special attention, of course, was turned to the Department of Fuel and Metallurgy. Often Yorkshire Juniors have met in that building to transact their Association's business, and always, by generous invitation of Professor Cobb, the gas-works plant there is open to their inspection at will; but, of course, there are not ordinarily the specially extensive facilities and studied arrangement of exhibits rendered possible on an occasion like that of this Celebration Week visit.

Having exhausted the possibilities of the red route in pressing through department after department among a great crowd of the public, those members of the gas industry who had time or inclination for an examination of other departments moved by the most direct way back to the main entrance, and there took yellow tickets for engineering, agriculture, physics, botany, and zoology—a route which a proportion of the gas men had taken initially, following up with the red route. For those with a special interest in colour chemistry, the route was blue, which comprised that department and dyeing, leather, geography, education, and electrical engineering.

Nobody, of course, was able to see all. The vastness of the Leeds University may be estimated when one understands that about one-quarter of the buildings were open to visitors on Saturday, and that anybody who saw half of what was on view—that is, one-eighth of what exists in this great centre of industrial education—was fortunate. There was no possibility of anything in the nature of a formal expression of thanks, as the members, once mingled in the crowd, never got together again. Despite the limitations necessarily involved in a visit in company with many hundreds, probably thousands, of the public, there is little doubt that all the members of the Association enjoyed a vastly interesting and instructive afternoon.

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**Institution of Heating and Ventilating Engineers.**—The Council of the Institution are offering during 1925 the following prizes for original papers on subjects connected with heating and ventilating: Lumby Premium, £10 10s.; Sirocco Premium, £10 10s.; and Grenville Premium, £5 5s. The winning of an award carries with it a medal of the Institution. The Lumby Premium will be for the best paper submitted dealing with, or any subject connected with, heating or hot-water supplies; the Sirocco Premium, for the best paper submitted dealing with ventilation and the general application of fans, air washing, air conditioning, dust and fume removal, mechanical draught, &c.; and the Grenville Premium, for the next best paper on any subject included in the above.

# LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

### A Two-Paper Evening.

The December business meeting of the Association—which took place last Friday evening at the Westminster Technical Institute, Vincent Square, S.W., under the Chairmanship of the President, Mr. W. NEWTON BOOTH, of Woolwich Arsenal, was devoted to the reading and discussion of two short papers. The subjects lent themselves to debate, and it was only the amount of time at disposal which limited the discussion. This was more or less conversational in character, but some of the main points raised will be indicated.

## THE SAMPLING OF GASES.

By J. H. GOLDSMITH, of the South Suburban Gas Company.

The sampling of gases for testing purposes on a gas-works is a subject to which much thought should be given. It is sometimes found that, though great care is exercised in the analyzing of a sample of gas, the method of collecting it is far from satisfactory. The best method should be employed in sampling the gas in each particular case, and the method adopted used regularly to enable true comparison of results to be made.

The gases that usually require to be sampled and tested may be divided into two groups:

(*a*) Coal gas, water gas, and district gas.
(*b*) Producer gas, and waste gases from retort settings and boilers.

In group (*a*), these three gases require a continuous sample to be taken over the 24 hours, to enable a representative sample to be obtained for the day. It is undesirable to make a few spot tests during the day, usually between 9 a.m. and 5 p.m., and then take an average of these to represent the working of the 24 hours. This sort of thing is by no means an uncommon procedure, but is wrong, as conditions frequently alter in the retort houses and other plant. Different results will often be obtained during the night-time, when there may not be the same amount of supervision. To emphasize this point, the following results of calorific value tests are shown.

| Average of Spot Tests taken between 9 a.m. and 5 p.m. | 24-Hour Sampler. |
|---|---|
| 480·8 | 487·2 |
| 482·2 | 478·4 |
| 479·8 | 482·0 |

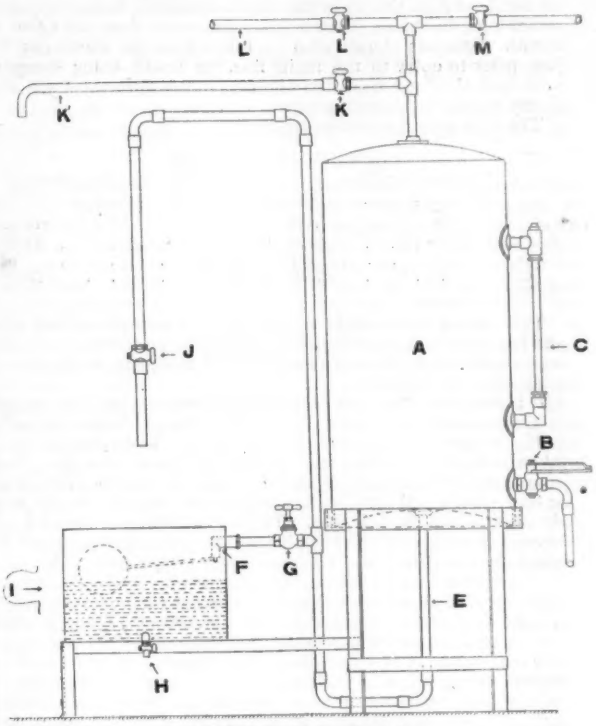
Spot tests, of course, have their use; but the futility of taking a few tests during the day, and averaging them to represent the working for the 24 hours, is seen from the above results.

There are various methods of collecting a sample of gas over a period of time, such as aspirators and test holders; but these are not ideal, because the rate of sampling varies, therefore not giving a truly representative result. A simple and convenient apparatus for taking a continuous sample of gas has been on the market for the last year or so. This apparatus, which is universally applicable and inexpensive, was described in the "JOURNAL" for Nov. 9, 1921, p. 433; but as some may not have seen this, a brief account is given here.

With reference to the accompanying diagram, the apparatus consists mainly of a container A of about 5 c.ft. capacity. This is filled with water by the valve B; arrangements being provided for completely removing any gas left from the previous sample. The water is then allowed to run out through the pipe E at a uniform rate, by means of the tank I fitted with a ball valve F. Gas is drawn in by pipe L; and the rate of flow of the water from tank I is controlled by valve H, which can be adjusted to suit requirements, allowing the container to be filled with gas over any number of hours. Should the water run-off too quickly, due to the valve H not being adjusted properly, and the container be filled quicker than expected, pipe E acts as a seal, and thereby prevents any loss of gas when the container is full. The apparatus is fitted with a water gauge C, enabling the amount of gas in the container to be seen instantly; and a suitable arrangement of overflow and testing pipes is provided.

In the use of this apparatus, queries have been raised as to whether the storing of gas in the container over water affects the calorific value or analysis to an appreciable extent, due to the absorption of any of the constituents by the water. This does not occur when using a test holder for storing the sample of gas, because the water is not changed each time, as in the sampler, and after use a few times the water becomes saturated with gas, and further absorption does not take place.

Tests were made to determine if the difference due to the gas standing over water was appreciable; and the results of these tests are given below. A sample of coal gas was drawn into the container over a period of two hours, the calorific value being taken every quarter-of-an-hour while the gas sample was being taken. The sample was allowed to stand for a quarter-of-an-hour. The calorific value was taken, and the sample left in the container for 21 hours.




**An Automatic Gas Sampler.**

*Gas Entering Container.*

| | |
|---|---|
| 559·1 B.Th.U. gross. | 595·2 B.Th.U. gross. |
| 573·1 ,, ,, | 596·2 ,, ,, |
| 565·3 ,, ,, | 619 6 ,, ,, |
| 564·8 ,, ,, | 585·1 ,, ,, |
| 576·2 ,, ,, | |

Average calorific value of gas entering container = 581·6 B.Th.U. gross.
Calorific value after standing ½ hour = 580·3 B.Th.U. gross.
Calorific value after standing 21 hours = 582·8 B.Th.U. gross.

The difference between the above results may be due to experimental error. It is interesting to note the large variation in the calorific value of the gas entering the container, emphasizing the need for continuous sampling.

A similar test was made to determine the $CO_2$ content. The times of sampling and testing were the same, except for the fact that the sample was left in the container for 17 hours.

| | |
|---|---|
| Average percentage of $CO_2$ in gas entering container . . . . | 2·7 |
| Percentage of $CO_2$ in gas after standing ½ hour . . . . . | 2·7 |
| ,, ,, ,, ,, ,, 17 hours . . . . . | 2·7 |

It will be seen from the foregoing tests that the difference after standing over water in the container is so small as to be negligible, and can be ignored for all practical purposes; the sampler proving to be a satisfactory and practical method of collecting a continuous sample.

The standard size of the sampler, as has already been mentioned, is about 5 c.ft., which is ample for usual requirements for a calorimeter test, specific gravity determination, and a sample for analysis. It is advisable to warm the calorimeter by means of the ordinary laboratory gas service, and to turn on to the supply from the sampler for only a few minutes before the test is made. This method does not require so much gas to be drawn from the sampler, and allows a reserve in case a duplicate test of any kind is required.

In works having more than one retort house, it is very desirable that a representative sample be obtained over the 24 hours from each retort house, to ensure that the best working conditions are maintained in each house, and to enable comparisons to be made. The gas in the retort house being under vacuum, suitable arrangements have to be made to draw the gas from the main; and the author suggests that one of the best methods of doing this is by means of a continuous sampler, such as that which has been described, which obviates the necessity for a separate aspirator.

In dealing with group (*b*), producer gases and waste gases from the retort settings require frequent sampling, so that proper control can be exercised upon the settings. Spot tests are usually required in these cases. The position of taking samples from settings varies, of course, with the design of the setting, but convenient sight holes are usually provided at the ends of the waste-gas flues, from which samples may be obtained. Frequently no provision exists for obtaining samples of producer gas; and attempts are made to collect a sample by inserting a bent tube through the sight hole in the combustion chamber, placing the end of the bent tube down a nostril hole. This is awkward to carry out, and not altogether desirable. A far better method is to have a sight hole built in the back of the producer chamber, from which samples can be obtained. This also has the additional advantage of allowing inspection to be made of the working of the producer. In dealing with waste gases, samples should

be obtained from the top of the regenerator, so that any by-passing which may be taking place in the regenerator does not affect the result. Samples should also be taken from the waste-gas flues just prior to entry in the main flue, the result being compared with that obtained from the top flue. Any difference will show if any by-passing is taking place.

The following tests illustrate this:

| Waste Gas (Top Flue). | | Waste Gas (Just Above Damper). | |
|---|---|---|---|
| | P.Ct. | | P.Ct. |
| $CO_2$ | 20·4 | $CO_2$ | 18·6 |
| $O_2$ | 0·2 | $O_2$ | 2·0 |
| CO | *Nil* | CO | *Nil* |

This shows that a slight amount of by-passing is taking place, and is given as an example to emphasize the necessity of sampling waste gases from the top flue, to see if complete combustion is attained in the setting.

It is desirable that the producer and waste gases be sampled at approximately the same time, so that the conditions prevailing in the setting are the same in each case. Tests should not be taken immediately after the furnace has been fired-up. Some time should be allowed for the new body of fuel to settle down, or bad results will be obtained which are only due to the extra air admitted during firing-up. The author suggests that the best method of collecting the samples is through a silica tube passing into a gas-sampling tube, by means of an aspirator. The latter should be fairly large, so that the gas can be drawn through the apparatus for about ten minutes before the sample is collected, in order to ensure a true sample being obtained. Silica tubes, of course, require careful handling, but with care they will last a very long time. The size of the tube suggested as convenient for general use is about 4 ft. long and $\frac{3}{8}$ in. internal diameter. A piece of gas barrel about 18 in. long should be inserted through the sight plug and secured by backnuts. Then the silica tube can be put through the plug; the iron pipe giving large bearing area, and thereby minimizing risk of breakage. Sampling from retort settings is facilitated if a number of these plugs be prepared. It is then only necessary to remove the ordinary sight plug, replace by the prepared plug, insert the silica tube, and carefully to fill the joints with fireclay.

In taking a sample of gas under vacuum, it is hardly necessary to emphasize the importance of thoroughly testing the apparatus before use, to see if there are any leaks. It is essential that a silica tube be used for both producer gas and waste gas tests, if accurate results are to be obtained, because the use of an iron tube gives a low carbon monoxide reading. The iron oxide on the hot iron tube converts some of the carbon monoxide to carbon dioxide. The amount of carbon dioxide formed in this manner varies with the temperature of the tube. The author found that, under normal conditions of sampling the producer gas from a horizontal setting, using an iron tube, the amount of carbon monoxide was reduced as shown below.

Tests were taken on the same settings at exactly the same time.

| Silica Tube. | | Iron Tube. | |
|---|---|---|---|
| | P.Ct. | | P.Ct. |
| $CO_2$ | 8·5 | $CO_2$ | 9·8 |
| $O_2$ | *Nil* | $O_2$ | *Nil* |
| CO | 21·7 | CO | 18·8 |

It can be seen that, unless a silica tube is used when sampling waste gases, any small percentage of carbon monoxide in the gas may be converted to carbon dioxide, and a completely false result obtained, probably giving a good impression, whereas incomplete combustion has really been taking place.

Steam boilers on a gas-works are usually rather neglected as regards technical supervision. So long as they make a certain amount of steam, little further thought is given to them. This is probably due to the fact that the class of fuel used is not very expensive; but even then one should aim at getting the best possible results. To do this the waste gases from each boiler should be frequently analyzed, to see that the fuel is not wasted. The method suggested for sampling these waste gases is the same as for retort settings.

Though the necessity for accurate testing of gas, in view of modern requirements, may be fully appreciated, the use of methods which give accurate sampling are of equal, if not of greater, importance.

### Discussion.

The PRESIDENT remarked that the question of accurate sampling was one the importance of which was not always realized, especially by some of the junior chemists employed in gas-works. It was necessary, as anyone who gave a moment's thought would appreciate, that the sample one took should accurately represent the bulk of whatever was being sampled. However accurate the analysis might be, the final result could never be any more accurate than the sample. The paper, had there been nothing else in it, would have been useful because it pointed this out.

Mr. WALTER GROGONO (Gas Light and Coke Company) thanked Mr. Goldsmith for bringing forward this subject, which was, as the President had stated, one of great importance. He (the speaker) agreed that a 24-hour sample was the only method of sampling, so far as gas was concerned; but he did not agree with the author's manner of taking the sample. Mr. Goldsmith put forward an apparatus which he said was going to take the same amount of gas hour by hour. But it had to be remembered that the make of gas would probably be varying very much, and the only method he (Mr. Grogono) knew of whereby such a sample could be taken accurately, was to couple an ordinary 12 c.ft. test meter by a chain to the dial of the station meter. In that way, one got a true proportion. He had seen this method put into practice, and it had shown rather astonishing results as compared with a 24-hour sample taken at a uniform rate. In several cases he believed it had been adopted as providing a true sample. He was glad the author had drawn attention to the importance of sampling waste gases from steam boilers.

Mr. GOLDSMITH admitted that the method suggested by Mr. Grogono of taking a continuous sample would be more satisfactory than the apparatus described in the paper, but at the same time it was by no means so simple. In cases where a sample over the 24 hours was required, his own method would be found satisfactory. Mr. Grogono's apparatus would involve appreciable time and expense in fitting up, and works should aim at getting as uniform a rate of manufacture of gas as was possible. It would be rather interesting to compare the two methods. What he did confidently claim for the apparatus which he had described, was that it was far ahead of any method of spot testing, whether taken every hour or every few hours.

The HON. SECRETARY (Mr. Leonard Lacey, Gas Light and Coke Company), referring to Mr. Grogono's criticism of the method of taking the 24-hour sample, said the same point had struck him, but he would like to know whether Mr. Grogono had evolved any method of applying the same process to the outlet gas. Here the difference in quantity was very much more marked. So great was the variation of the output that if they took a 24-hour sample of the outlet gas at a uniform rate the result must prove fallacious. The paper dealt with the taking of samples for arriving at the calorific value of the gas. This, he took it, could only be ascertained by analyzing the gas, and deducing the calorific value from the analysis.

Mr. GOLDSMITH: There is sufficient gas in the container for getting a calorific test. It is connected-up to a calorimeter.

Mr. LACEY: Is it not rather difficult to get an accurate test of calorific value with 5 c.ft.?

Mr. GOLDSMITH replied that the calorimeter would be warmed-up first with the ordinary laboratory gas service, and got working.

Mr. GROGONO said he thought, as far as the engineer of the works was concerned, if he was sampling his coal gas and his carburetted water gas, his outlet gas could be taken well enough on a reliable recording calorimeter. This would tell him if he was going up or down badly.

Mr. GOLDSMITH agreed that, if one sampled both coal gas and carburetted water gas when manufactured, there was very little to worry about with regard to the outlet gas.

Mr. J. HEWETT (South Metropolitan Gas Company) remarked that, in the early part of the paper, the author said: "Different results will often be obtained during the night-time, when there may not be the same amount of supervision about the works. To emphasize this point, the following results of calorific value tests are shown." He then went on to give three results of spot tests, and three with the 24-hour sampler. If each column were added up, and divided by three, it would be found that the variation in B.Th.U. was 1·6. This did not emphasize very much difference; it almost went to show that the results were similar. Had the author tried to estimate the calorific value of his sample right through, or had he only taken one? He had 5 c.ft. to play with, and, as he had remarked, if the calorimeter was warmed-up and got into working order, this was ample to take more than one test with. If he did take more than one test from a single sample, he might find a difference, owing to stratification, between his first and his last tests. As to the flue gas figure, he took it that the waste gas from the top flue and the waste gas from just above the damper were intended to be comparative results.

Mr. GOLDSMITH: Yes, they were taken at the same time.

Mr. HEWETT pointed out that if the figures were added up, they came to 20·6 in both cases, and in each column the CO was *nil*. If in one case 1·8 of $CO_2$ was added, and there was no CO to get it from, where did it come from? He agreed as to the use of silica tubes, especially in combustion chambers and zones. This had been the practice in well-ordered gas-works for a number of years. He was glad this subject had been brought forward, because it could not be emphasized too much that any laxity in the collecting of the sample damned the result before a start was made.

Mr. GOLDSMITH replied that there was no extra percentage of $CO_2$ from anywhere. In the first result the percentage of $CO_2$ was obtained from the waste gas just as it left the top of the setting, and the reduction to 18·6 p.ct. in the second case was not due to the $CO_2$ being lost, but to air being drawn in and diluting the waste gas.

Mr. HEWETT thought there must be a hole in the flue.

The PRESIDENT pointed out, on the contrary, that the leakage indicated was remarkably low.

Mr. GOLDSMITH, referring to Mr. Hewett's remark about stratification, said of course this state of affairs was possible, but with gases entering in the manner described in his paper, one always got turbulence. Personally he did not think stratification took place on such a small scale as this, where the gas was being used frequently. He had not carried out any tests to ascertain whether one got the same result by taking two or three. As to the spot tests, these were taken on different days some time apart, and it was not much use averaging tests taken one day with those taken on another. He was only putting these tests forward to compare them with the others in every case. Replying to a point raised by Mr. White, Mr. Goldsmith went on to say that he had taken very many tests, and had not found any race of CO in waste gases. The amount of oxygen varied, from time to time, but in good settings they reckoned to get it as low as 0·2 p.ct.

The PRESIDENT said the author had indicated that he aimed at getting only a small amount of oxygen in the waste gases, but that the percentage varied from time to time. At what time during the run of the producer—that was, between the feeding and clinkering periods—did he take his analysis in order to arrive at this particular composi-

tion? As the result of a fair amount of experience, he (the speaker) could state that, with self-contained producers and any ordinary type of grate, it was impossible to keep a steady supply of producer gas. Immediately after the fire was cleaned, the quantity of producer gas made was considerably more than it was just before, and consequently it must be very difficult indeed to ensure a constant composition of the waste gases. How did the author take his sample, and what stage in the run of the producer did the 0·2 p.ct. represent?

Mr. GOLDSMITH said he had found that, with the type of producer his Company used, from an hour after being fired-up until an hour before firing-up the conditions remained practically constant. They did not take samples of waste gas either immediately before or immediately after firing-up, but at any period within the limits he had named they reckoned to get a good result. The 20·4 p.ct. $CO_2$ and 0·2 p.ct. oxygen were results which were repeated time after time. Continuous samples had been taken, and it had been found that they varied very little, so now they took them at random, with the exceptions he had indicated. Of course, continuous sampling was better, but was hardly warranted in small works. With a good producer it should be possible to take samples at any time within the limits he had specified.

The PRESIDENT said this cleared-up the point. He was only anxious it should not be assumed by anyone that the gas was always the same.

### MAINTENANCE OF APPARATUS ON THE DISTRICT.

Mr. W. R. MOGER (of the Tottenham District Light, Heat, and Power Company) followed with the second paper, which dealt with the "Maintenance of Apparatus on the District." This, with a report of the discussion, is held over until next week.

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Before the members separated, a hearty vote of thanks was passed to the two authors, on the proposition of Mr. W. T. KENSHOLE, seconded by Mr. D. J. WINSLOW.

## POSITION OF ILLUMINATING ENGINEERING.

In an address to the Scientific and Technical Circle of the Institute of Journalists, last Thursday, Mr. LEON GASTER traced the development of illuminating engineering during the past twenty years. He recalled that in 1905 he advocated, in the "Times Engineering Supplement," a standard specification for electric lamps. Such a specification, he pointed out, was now in existence, and both manufacturers and users contributed to the framing of it. Further reminiscences led to an account of his visit, in 1907, to the United States, where an Illuminating Engineering Society had just been formed. On his return to this country he started the "Illuminating Engineer," and in 1909 was instrumental in founding the Illuminating Engineering Society in London—the first body of the kind to be formed in Europe.

Since that date an interest in all forms of lighting had sprung-up in other countries, and Illuminating Engineering Societies had been formed in Austria-Hungary, Germany, and Japan. Various aspects of lighting had been dealt with at many international congresses—notably the First International Conference on Industrial Hygiene, and the meeting of the International Illumination Commission (a body with National Committees in all the chief countries) this year. Lighting, in short, had become a subject of international interest.

Recognition of the importance attaching to good industrial lighting, as an essential to health, safety, and efficiency, led in 1913 to the formation by the British Home Office of a special Departmental Committee to study this subject. It was anticipated, in accordance with this Committee's reports, that provisions requiring adequate and suitable lighting would be embodied in the Factory Acts in the near future. Details could only be dealt with on the basis of recommendations.

The Illuminating Engineering Society were now embarking on a widespread scheme for promoting public appreciation of the benefits of good lighting. In conclusion, Mr. Gaster pointed out that good lighting was of interest to all sections of the community, and that the Press could render most valuable aid in bringing home its importance to the public.

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**The Gas Salesman's Diary and Handbook, 1925.**

This little volume, which earned such widespread popularity when the first edition appeared last year, has now been published at the uniform price of 3s. 6d. net. Gas salesmen found the former edition of immense usefulness, and will be glad to hear that the 1925 Handbook has been entirely revised and largely extended. The "Useful Information" now includes sections dealing with the "N.G.C." cooker, the gas consumption of different appliances for both domestic and industrial use, and the flow of gas in pipes; and the information regarding the Standard meter has been considerably amplified. Also, a successful attempt has been made to render the edition for 1925 much more convenient; and a limp cover with flush edges, rounded corners and back, greatly improves its appearance and facilitates handling. It is obtainable from the "JOURNAL" Offices, No. 11, Bolt Court, Fleet Street, E.C. 4.

## AMERICAN GAS ASSOCIATION.

### Review of Reports and Papers.

[FIFTH ARTICLE.]

Articles on tar separation and dehydration are included in the report of the Committee on Disposal of Waste from Gas Plants.

#### Water Gas Tar Filtration.

The filtration system installed in connection with the water gas plant of the Malden and Melrose (Mass.) Gas Light Company is described by Mr. R. S. Carter. In this practically all the waste liquids on the works containing tar and oil are treated. Direct contact between the cooling water and the gas takes place in the condensers, which require 27,500 gallons of cooling liquor per hour, based on a make of 6 million c.ft. in 24 hours, with a gas inlet temperature of 180° Fahr., and outlet 100° Fahr. Tests of this and other apparatus showed that there were three divisions of the condensable products removed from the gas. These were: Hot liquor, and the heavier products from the wash boxes and drips up to, and including, the outlet drip of the relief holder; liquor removed from the drips between the condensers and the purifiers, including the overflow from the tar extractor, scrubber, and condensers; and liquor removed from the purifiers and pipe drips to the storage holder, and that pumped from the distribution drips. For a time, the first two divisions were combined, and run through the filter together. It was, however, discovered that the tar was not settling-out, and that the water in the filter was being replaced by emulsion. Thereupon it was decided to eliminate most of the drip liquor from the filter; and condensate from the tar extractor and scrubber was pumped direct to the relief holder tank, which is used for water-gas tar and emulsion storage. Formation of emulsion in the filter was thereby reduced.

The filter is of reinforced concrete, and comprises two main separating chambers, with adjustable baffles; an inlet receiving tank; a re-circulating tank, from which the water to be cooled in the spray ponds is drawn; an oil-collecting tank; and a compartment for coke and sand, through which the excess water from the filter flows before it runs to the river. The separating tanks have a capacity of 115,000 gallons, exclusive of the re-circulating division. The baffles retard the flow of the liquid as it passes through the filter, and the tar oil is skimmed from the surface by means of skimmers connected to a pipe running to the oil-collecting tank. The separated water is cooled in ponds, and then pumped again through the condensers. The treatment of the emulsions retained in the separator forms a distinct process.

#### Dehydrating Tar.

Mr. G. A. Simmons, of the Philadelphia Suburban Gas and Electric Company, Chester (Pa.), describes a method for the dehydration of tar, &c. The process consists of the continuous circulation of a certain quantity of the hot dehydrated coal-gas tar, water-gas tar, or other emulsions, through a specially-designed steam coil heat-exchanger, a dehydrating tank connected with a condenser, and a mixing tank, with the addition of the product to be dehydrated at the mixing tank. The product to be dehydrated is passed through a ¼-in. strainer, and travels by gravity through a constant feed regulator into the mixing tank. The product to be dehydrated is slowly heated, and circulated until the water content has been reduced to about 6 p.ct. The temperature of the heat-exchanger is raised gradually to 245° Fahr. Then cold product to be dehydrated is added at the mixing tank to the hot circulating partly dehydrated tar, &c., reducing the temperature of the mixture to about 190° Fahr. This mixture is pumped through the heat-exchanger, and enters the dehydrating tank. At this point the water as steam passes into the condenser, and the partly dehydrated material is divided—a portion going into a small unit for the removal of the last traces of water, and the remainder entering the mixing tank, to be mixed with the cold tar or emulsion from the overhead storage, and again pumped through the heat-exchanger. The quantity of the product added at the mixing tank is determined by the temperature at the outlet of the heat-exchanger, which must be constant at 245° Fahr.

The plant described is capable of dehydrating 450 gallons per hour of tar having a moisture content of 25 p.ct., at a temperature of 60°; and the total cost is about one-third of a cent per gallon of resultant dry tar.

#### Tests of Oxide.

The Purification Committee, organized last March as a Sub-Committee of the Chemical Committee (under the Chairmanship of Mr. A. F. Kunberger, of the "U.G.I." Contracting Company, Philadelphia) to consider various questions, found the time at disposal so limited as to preclude fresh experimental work the results of which might have been given at this meeting. They therefore confined activities to the collection of data already available.

Investigations already reported have shown that not all forms of iron oxide act alike, and that an oxide or ore can be very high in iron oxide, and yet be a decidedly poor purifying agent. Methods differing from the ordinary elementary chemical analysis have been devised to determine the suitability of oxide for purification purposes; and these may be divided into activity tests and capacity tests. Their value to the operating engineer depends largely upon the proper interpretation of the results obtained. In tests a gas is passed which is capable of almost totally combining with the oxide, and which does not contain such materials as may poison the oxide. The mass action produced by this condition

may have a detrimental effect on the oxide, by creating such a high temperature when testing that, unless great care is exercised, the results are misleading. On the other hand, in practice a very good oxide may be spoiled by the presence in the gas of tar and other impurities, and not give the results foreshadowed by the tests. The oxide should be kept free from substances which are apt to cover its surface, forming an insulating coating and thus preventing the gas from actually coming in contact with the oxide. One factor which is frequently overlooked is the composition of the inerts, especially in bog ores. If a bog ore or any other oxide bakes into hard cakes, as is often the case, or forms a slimy mass when mixed with water, it will give poor results in practice; yet it may contain very active material, and on a fouling test may show very fair absorption. The failure of this type of oxide is due to the fact that its physical properties are such that only a small portion of the material becomes active. The remainder is, from the beginning, inaccessible to the gas. For this reason, special attention should be given to a very clayey oxide, to ascertain whether it has a tendency to cake.

Much has been said about the activity test *v.* the capacity test, but it appears that no particular attention has been paid to the fact that the activity of an oxide seems to be in direct relation to its apparent specific gravity—in other words, porosity. Eleven years ago it was pointed out in a paper presented to the American Gas Institute that the most efficient oxide invariably has the largest volume for a given weight. Microscopic examinations also show that each grain in the most active oxides has the structure of a sponge. Another characteristic, as brought out in the above paper, of these very active oxides was their absorption power. They are capable of holding more water per unit than the less active ones, and they have no tendency to cake. After they have been saturated with water, they return to their original loose state as the water is given off on drying.

The experimental box is, no doubt, the most satisfactory method of testing an oxide for its purifying qualities, but it requires too much time and attention to be of any use for a control test of shipments. Later modifications of the fouling test will give the same information, if carefully carried out, and if the results are intelligently used.

It is, of course, extremely difficult to get a representative sample of spent oxide, and for this reason the analysis of spent oxide is useless unless the results are computed to the original composition. It is important to keep a daily record of the $H_2S$ on the inlet and outlet of each box, if one wishes to have accurate knowledge of the work done by any batch of oxide. This will enable one to figure correctly the purification cost for any batch or type of oxide.

No matter what oxide is employed, the sponge should be slightly alkaline, and where bog ore is used it would be advisable if a solution of sodium carbonate or lime were sprayed on the mass while mixing. Half-a-pound of lime or soda ash per bushel of oxide would not materially increase the cost, but would assure greater activity.

The temperature of the gas and mass is also a very important factor. Purifiers cannot work satisfactorily when kept too cold. Actual experience in a number of plants showed that boxes passing 80 p.ct. of the total $H_2S$ removed all but 25 p.ct. after the temperature of the gas had been raised from about 60° to 90° Fahr. Keeping the boxes warm not only increases the velocity of reaction, but prevents the oxide from becoming "soggy." The best results are obtained when the temperature of the box is kept at about 70° Fahr., and the gas at the outlet of the box is a few degrees higher than at the inlet. This renders it certain that the gas will not deposit any water in the box. It will keep the oxide porous, and retain the maximum surface contact with the gas.

### Using Oxide without Shavings.

A number of European plants were asked for information with regard to the practice of using oxide without shavings. Some experimental work upon this form of oxide purification has been carried out in the United States, but the data on these tests are not yet available. The report tabulates some of the replies received, and points out that the main features of this method are economy of space and reduced cost of handling. It may be deduced from this information, the report adds, that using oxide without shavings does not necessarily increase back-pressure.

## CARBON DIOXIDE AS A GAS-POISONING REMEDY.

At a meeting, on Dec. 18 in the Birmingham University, of the South Staffordshire and Warwickshire Institute of Mining Engineers, Dr. J. S. Haldane (President of the Institution of Mining Engineers) read a paper of considerable interest to chemists and the mining and chemical industries, on the use of carbon dioxide as a remedy in gas poisoning.

Dr. Haldane pointed out that, when a person is rendered unconscious or disabled by carbon monoxide or other irrespirable gas, the first thing necessary is to get him into better air, and, if his breathing has stopped, to apply artificial respiration without a moment's delay—preferably by Schäfer's method—until natural breathing returns. In cases of carbon monoxide poisoning, oxygen ought also to be given if it is available. The advantage of the oxygen is twofold. In the first place, it gives an immediate, and very important, additional supply of oxygen to the tissues, owing to the very appreciable amount of oxygen which goes into simple solution in the blood passing through the lungs; and, in the second place, the oxygen turns out carbon monoxide from the blood about five or six times as fast as would an equal volume of air. As soon as the acute want of oxygen is relieved by inhaling pure oxygen, the breathing diminishes greatly, and as a consequence carbon monoxide is not got rid of much faster than if air were breathed.

In order to remedy this defect, and expedite to the maximum extent the expulsion of carbon monoxide, about 5 p.ct. of carbon dioxide is added to the oxygen used for treatment. With this addition, the oxygen is far more effective. Very large quantities of it are breathed, since the breathing is greatly stimulated; and the carbon monoxide is consequently expelled far more rapidly than when either pure oxygen or air is used. In carbon monoxide poisoning, unless sufficient carbon dioxide is present in the air, the stimulus of want of oxygen is neutralized by the opposing influence of deficiency of carbon dioxide; hence the circulation cannot increase. But directly the carbon dioxide is supplied in the air, there is a great increase in the rate of circulation.

## PURIFIER HOUSE ACCIDENTS.

Some recent accidents have led the Accident Prevention Committee of the American Gas Association to issue recommendations for prevention of mishaps in purifying houses. They draw attention to the need for all station gauges being read and recorded by foremen and watchmen at regular intervals, and for any unusual conditions being reported immediately. The adequate ventilation of purifier houses is of paramount importance, and all buildings must be so designed as to render impossible the dangerous accumulation of gas in any part of the structure. All operations must be conducted so as to minimize the possibility of the ignition of any gas which has escaped and accumulated. Smoking and the carrying of matches or lighters must be forbidden, and special safety globes must be employed. Owing to danger from sparks, employees' footwear should be free from iron nails, and so formed that small stones will not lodge. Whenever possible, iron-to-iron contacts between wrenches, valve keys, and other operating appliances should be eliminated by the interposition of brass or some non-metallic jacket or part. The use of brass or bronze tipped picks is suggested for the work of removing purifying material from the boxes. If power is required and other sources than electricity are impracticable, all electric motors, together with their controls, should be installed in buildings separate and distinct from those used for purification. When opening boxes, a hose must be available. No man should work alone at any time in or around purifying equipment. Indoor purifying boxes which have been opened up should be emptied out that same day. After filling, the cover must be placed in position, and the box purged of air.

## Berginization of Coal.

The process originally patented by Bergius in 1914, for obtaining oil from coal by means of hydrogenation at very high pressures and temperatures of the order of 400° to 500° C., was referred to by Messrs. Nash and Shatwell in a paper presented by them recently to the Institution of Petroleum Technologists. The proposition is that if coal which contains less than 85 p.ct. of carbon is ground down to a fine powder, mixed with a mineral or tar oil, and the mixture heated for several hours with hydrogen at pressures over 100 atmospheres, and temperatures between 400° and 430° C., the coal can be converted largely into a liquid product, which closely resembles a crude mineral oil. The process has naturally aroused much interest, because of the far-reaching effects which its establishment on a commercial basis would have. Experiments carried out in Birmingham University on the hydrogenation of coal showed that very little change took place if the material were heated alone with hydrogen. If, however, the coal is mixed with a substance like phenol, or a high-boiling mineral oil, and then subjected to hydrogenation, considerable absorption of hydrogen occurs, and a large proportion of the coal becomes liquid. In one case, 50 p.ct. of the coal was transformed into a mobile liquid resembling a crude mineral oil; and there seems to them to be little doubt that the process should develop on a large scale. The oil first selected for the experiments was a gas-oil fraction which had been investigated previously in regard to hydrogenation; but as it was found impossible to separate the liquefied coal from the oil, it was decided to use instead a solvent which would be not only unaffected by the experimental conditions, but also easily separated from the liquefied coal product. Phenol was treated under similar experimental conditions, and was found to be quite stable. As it possesses the advantage that it can be removed completely from the products by chemical means, and that it remains in the liquid phase under the experimental conditions, it was decided to use this as the solvent. It has one disadvantage, however, in that caustic soda, when removing the solvent, removes the phenolic substances produced during hydrogenation.

# RATES OF CARBONIZATION

## OF BITUMINOUS COAL IN RELATION TO COMBUSTION CHAMBER TEMPERATURES.

By R. E. THWAITES, M.A. (Oxon.).

[In a review of a Bulletin of the Commonwealth Institute of Science and Industry on "The Production of Liquid Fuels from Oil Shale and Coal," published in our issue for March 26 last (p. 779) it was stated: "Unpublished data in the author's possession indicate that the rate of carbonization of coking coals in externally-heated retorts is proportional to the fourth power of the absolute temperature of the internal surface of the retort—in other words to the amount of radiant heat leaving that surface in unit time." Mr. Thwaites has kindly forwarded for publication the data in question, together with comments.]

When coal is carbonized in either horizontal or vertical retorts of refractory material by heat applied externally to the retort walls, it has long been known that the speed of carbonization rapidly increases with the temperature of the combustion chambers. It has been tacitly assumed that heat is transmitted through the walls of the retort by conduction, and then from the inside surface of the retort mainly by conduction through the coal, assisted by convection of the vaporous products and by radiation. The comparative slowness of the process of destructive distillation has been usually ascribed to the poor heat conductivity of coal and coke.

In 1918 (I think) a report on heat transmission through refractory bricks appeared under the auspices of the Refractories Research Committee; and Dr. Mellor, in commenting on the work, drew attention to the probability of heat being transmitted through the pores of the bricks by convection and radiation. He went so far as to calculate that, if the ratio of pore space to solid attained certain dimensions, radiation would predominate over conductivity at high temperatures.

The assumptions on which this inference was based were later traversed by Prof. Cobb, on the ground that actual measurement of the pore spaces showed that the influence of radiation could not be great until temperatures well above the fusion point of the materials ordinarily used for refractory bricks. The latter objection does not hold, however, with respect to the possibility of heat transmission by radiation from the inside walls of a gas retort through the coal itself, since there is always a considerable percentage of free space between the pieces of coal, and, after coking has begun, the free space is largely increased. It occurred to the writer some years ago that, if heat reached the coal predominantly by radiation from the walls, it ought to be possible to test the point by comparing the relative radiant intensities at different carbonizing temperatures with the measured time of carbonization or throughput of a retort. According to Stefan's law, the energy E radiated in B.Th.U. per sq.ft. per hour $= 16 \times 10^{-10} (T^4_1 - T^4_2)$; $T_1$ and $T_2$ being the absolute temperatures (°Fahr.) of the radiating and absorbing surfaces respectively. The average temperature of the internal walls of a retort is difficult to arrive at. According to Dougill, it is of the order of 300° C. below that of the combustion chambers. If so, the average temperature of the latter is approximately equal to the absolute temperature of the inside skin of the retort. On the supposition that heat passes from the walls into the coal entirely by radiation, it follows that the intensity of radiation, and, therefore, speed of carbonization, is proportional to the fourth power of the combustion-chamber temperature. The value of $T_2$, the average absolute temperature of the absorbing medium—*i.e.*, the coal—is also unknown; but it is assumed to be in a constant ratio to $T_1$, it may be neglected in calculations of relative speeds of carbonization. It has proved difficult to obtain reliable data to test this point. It is, of course, necessary that the same coal should be carbonized in the same retorts to approximately the same loss of volatile matter and at least two different average temperatures, the latter being reliably measured and recorded.

The following instances have been collected:

(1) "Carbonization in Glover-West Retorts," by John West (*vide* "JOURNAL" for Nov. 13, 1917, p. 314), of Haigh Moor coal at 1362° C. and 1160° C. respectively. Measured throughput, 4·17 tons and 2·23 tons of coal per 24 hours respectively.

$$\text{Ratio of throughput} = \frac{4{\cdot}17}{2{\cdot}23} = 1{\cdot}87$$

$$\text{"} \quad \frac{1362^4}{1160^4} \quad . \quad . \quad . \quad . \quad . \quad = 1{\cdot}899$$

Difference = 1·5 p.ct.

(2) Carbonization times in horizontal retorts, from a paper by G. M. Gill (*vide* "JOURNAL" for Oct. 19, 1921, p. 212). When combustion temperatures were 1270° C., 1310° C., and 1400° C. respectively, carbonization periods for full retorts were 12, 10, and 8 hours respectively.

*Ratios:*

$$1270^4 : 1310^4 : 1400^4 = 2{\cdot}595 : 2{\cdot}945 : 3{\cdot}841.$$

If these values represent relative rates of carbonization, then the rate by time in hours for each represents a constant—viz., the heat required to carbonize one full retort of coal.

Therefore—

(1) 2·595 × 12 = 31·14
(2) 2·945 × 10 = 29·45
(3) 3·841 × 8 = 30 73

} a constant approximately.

Difference (1) and (2) = 5·7 p.ct.
(2) and (3) = 4·3 p.ct.

(3) During carbonization tests in a continuous vertical retort in Melbourne (1922), the following results were obtained by the writer.

*Test* 4.—Average temperature of combustion chambers, 891° C. Coal carbonized per day, 3·196 tons.

*Test* 5.—Average temperature of combustion chambers, 1013° C. Coal carbonized per day, 6·22 tons.

$$\text{Ratio of throughputs} = \frac{6{\cdot}22}{3{\cdot}196} = 1{\cdot}946$$

$$\frac{T^4_2}{T^4_1} = \frac{1013^4}{891^4} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad = 1{\cdot}699$$

} Difference = 16 p.ct.

During Test 4 no steam was used. During Test 5 moderate steaming was practised, which would have the effect of carrying sensible heat from the coke into the charge, and thus increasing the throughput. This probably accounts for the discrepancy of 16 p.ct.

NOTE.—The coal was weighed for each test, and elevated in a calibrated skip. The results from direct weighing and measured number of skips agreed. Temperatures were read in twelve combustion chambers once a shift by a Brown optical total-heat pyrometer specially calibrated at the Physics Laboratory of the University of Melbourne. The coke was fully carbonized up to the limit set by the temperatures used.

The degree of agreement in three quite independent sets of data is remarkable, and appears to justify the statement that the rate of carbonization in externally-heated retorts is proportional to the amount of energy radiated from the internal surface of the retort in unit time. In other words, heat is transmitted to the coal primarily by radiation.

If we assume that 1 ton of coal requires for complete carbonization and *removal of the products at the working temperatures* about $1{\cdot}5 \times 10^6$ B.Th.U., then in the test where 6·22 tons were carbonized per 24 hours, $9{\cdot}33 \times 10^6$ B.Th.U. were transmitted through the retort walls. If we assume further that this heat reached the coal from the inside walls by radiation, then

$$9{\cdot}33 \times 10^6 \text{ B.Th.U. per day} = 16 \times 10^{-10} \times 228^* \text{ sq. ft.} \times 24 \text{ hours} \times (1855^4 - T^4_2)$$

whence $T_2$ in absolute degrees Fahr. = 1812° = 1289° Fahr. = 698° C.

* The heated surface of the retort was 228 sq. ft.

The average temperature of the absorbing surface of the coal, therefore, equals 1289° Fahr., or 698° C. This result is not improbable when it is remembered that the coke at the bottom of the retort is almost as hot as the walls, and that the time the coal and coke remain in the lower sections of the retort is much longer than in the upper sections.

Again, taking the heat conductivity of firebrick (at 1000° C.) as 0·9677 B.Th.U. per sq.ft. per ft. per hour per 1° Fahr.

$$9{\cdot}33 \times 10^6 \text{ B.Th.U. per day} = 0{\cdot}9677 \times 228 \times 4^* \times 24 \times T$$

whence T = 440·6° Fahr. = 227° C.

* Average thickness of retort wall = 3 in.

Whence the average temperature of internal walls =

1855° − 440·6° Fahr. = 1414·4° Fahr.
or 1013° − 227° C. = 786° C.

Therefore the average difference of radiating and absorbing surfaces = 88° C.

(Cp. diagram by Euchène, on p. 100 of V. Lewes' "Carbonization of Coal," showing temperatures in coal and in space above coal in a horizontal retort. The average temperature difference during carbonization = 93° C., being 260° C. after half-an-hour from the start, and 15° C. only at the end of the 4-hour carbonizing period.)

On p. 114 of "Low-Temperature Carbonization" (Lander and M'Kay, 1924) we read: There is a certain amount of experimental justification for assuming that the time required for portions in the interior of a mass of coal to be heated to a temperature within a few degrees of that of the heating surface varies roughly as the square of the distance from that surface of the portion considered." This is equivalent to saying that the heat intensity varies inversely with the square of the distance—*i.e.*, the heat is transmitted by radiation.

### LOW THROUGHPUT OF EXTERNALLY-HEATED RETORTS.

If the above analysis is sound, the prime reason for low carbonization rates of bituminous coal in gas-works retorts is the small average difference in temperature between the inner wall of the retort and the heat-absorbing surface of the coal or coke.

The explanation of the more rapid carbonization of non-coking coals, lignites, and mixtures of coking coal with coke, &c.—as shown by E. V. Evans and others—may, in accordance with this view, be found in part in the increase in the temperature difference between the radiating retort-wall and the heat absorbing surface of the material, due to quicker evolution of gases and vapours consequent on a lesser viscosity of the tarry envelope from which the gases and vapours must escape before radiant heat can penetrate further into the carbonizing material.

# CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

### Liquor-Circulating Arrangements at Morriston.

Sir,—I notice that Mr. W. H. Johns, in his recent Presidential Address to the Wales and Monmouthshire District Institution of Gas Engineers and Managers, mentioned my name in connection with the liquor-circulating arrangements he has adopted in his new retort house.

In order to avoid the possibility of any misunderstanding, I should like to say that this system was adopted at Mill Hill after I had seen it in successful operation at the Wapping Works of the Commercial Gas Company.

F. J. PEARCE.

*North Middlesex Gas Company,*
*The Broadway, Church End, Finchley, N.,*
*Dec.* 15, 1924.

### A Distinctive Sign for the Therm.

Sir,—I notice in the current issue of the "JOURNAL" a suggestion as to the above.

May I be allowed to contribute one which I have used for some time, not only in my notes, but also in lantern slides—*i.e.*, the Greek "theta," θ?

"WALES."

*Dec.* 18, 1924.

# REGISTER OF PATENTS.

### Gas Burners.—No. 219,678.

BRITISH THOMSON-HOUSTON CO., LTD., of Aldwych, W.C. 2 (assignees of C. A. Brown and A. C. Nielsen, both of Cleveland, Ohio).

No. 16,714; July 11, 1924.

Convention Date: July 23, 1923.

This invention relates to gas burners of the type comprising inner and outer distributing chambers communicating by passages located opposite the fire orifices. The object of the invention is to provide a burner from which a uniform intense heat is secured. The burner is for glass working, particularly the various operations on bulbs and tubing entering into the manufacture of incandescent electric lamps and similar devices.

On either side of the main fire orifices are one or more series of smaller fire orifices; the mixture of gas and air issuing from these orifices at substantially the same velocity as from the main orifices. When the nature or quality of the gas or the presence of foreign matter gives difficulty in maintaining a high-pressure concentrated gas flame, the mixture as it issues from the smaller orifices may be further broken up by covering them with a finely-perforated strip—for example, wire gauze.

The burner is fully described and illustrated in the specification.

### Production of Dry and Neutral Sulphate. No. 224,697.

HENSHAW, S., STONIER, S., and TALK O' TH' HILL COLLIERY, LTD., all of Stoke-on-Trent.

No. 26,526; Oct. 24, 1923.

This specification describes a method of sulphate production in which the neutralization and/or washing is followed by drying in such manner that the whole operation is performed mechanically, and an important subsidiary feature is the application of an atomized spray of ammonia or the like liquor for washing or neutralizing.

In a preferred form of the invention, the acid sulphate of ammonia is washed with a dilute solution of ammonia, applied in atomized form by an air blast. The moist neutral sulphate is discharged into a boot from which it is automatically carried by a bucket elevator to the top of a cylindrical hot-air drier provided with a plurality of horizontal shelves down which it is passed by rakes or rabbles. Hot air is supplied at the bottom of the drier, preferably by the combustion of coke-oven or other gas in a subsidiary chamber. At the bottom of the drier (which is mounted considerably above floor level), the material is dropped on to a belt conveyor which carries it to a hopper at which the bags are filled. It is preferred to provide a plurality of rollers for crushing lumps of material formed during drying; and these rollers may be at the exit from the drying chamber and at the inlet to the hopper. If desired, a sieve may be employed; but usually this is not necessary.

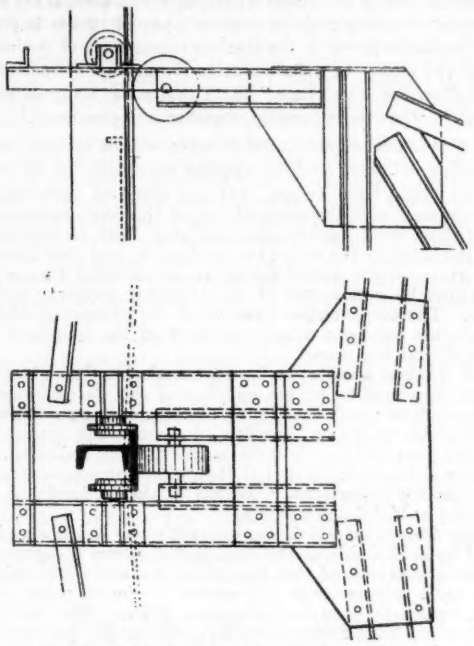
### Erection of Dry Gasholders.—No. 224,728.

MARKS, E. C. R., of Lincoln's Inn Fields, W.C. 2.

(A communication from Maschinenfabrik Augsburg-Nürnberg.)

No. 29,514; Nov. 22, 1923.

"Dry" gasholders have previously been erected by suspending the finished closing disc in the form of a working platform or scaffolding from a mast or from the gasholder posts in such a manner as to be capable of sliding thereon and of being adjusted at any desired height, in order to allow the plates forming the outer shell of the holder to be mounted to fit the disc. This method permits the desired accuracy in the fitting of the plates, but has the drawback that it requires an adjustment or alignment of the posts, the position of which has to be continuously measured and re-examined—an operation which is connected with a great loss of time. The object of this invention is to eliminate this measuring work and thereby save time and labour. By the present invention the required alignment of the posts is effected positively by the closing disc itself, during the rising movement of the latter. To avoid undue stresses in the posts and consequent distortions which may occur when the disc is pulled up along them, the raising of the disc is preferably effected by pressure from below; for instance, by compressed air.



**Arrangement for the Erection of "Dry" Gasholders.**

According to one mode of carrying the invention into effect, auxiliary frames, which closely surround the posts, are temporarily fixed to those parts of the closing disc (or of a strengthening ring provided thereon) which correspond to the positions of the posts or of the guide rollers of the disc; these frames being provided with auxiliary rollers by means of which the individual posts are pressed against the guide rollers of the disc and are thereby aligned. The auxiliary rollers are constructed as stepped pulleys, and abut with their surfaces against the narrow sides of a flat rail fixed to each of the posts.

The arrangement will be clearly understood from the side elevation and plan which we reproduce.

### Low-Pressure Gas Burners.—No. 224,763.

DODGE, H. H., of Buffalo.

No. 1668; Jan. 21, 1924.

Among the principal objects of this invention are to provide for obtaining an oxidizing or a non-oxidizing flame at the will of the operator; to secure a perfect mixture of air and gas; and to simplify and cheapen construction.

The claims are for: A gas burner, comprising an opened-ended one-piece body member having a cylindrical and a frusto-conical section, the diameter of the inner end of the frusto-conical section being smaller than the diameter of the cylindrical section to form an annular shoulder at the junction of the two sections; a tubular air nozzle having its forward or outlet end opening into said frusto-conical section, and having two laterally extended flanges, spaced apart a distance approximating the length of the cylindrical section of said body to form an annular gas chamber within said section, the forward flange being perforated for introducing gas from said chamber into the frusto-conical section of said body; means for operatively connecting said body and nozzle to hold the forward flange in juxtaposed relation to the shoulder at the juncture of said cylindrical and frusto-conical sections; and means for rendering air and gas tight the joint between said forward flange and said shoulder, said means embodying a gasket and an aligning groove for holding the same.

### Coin-Freed Meters.—No. 224,782.

MAJOR, P. F. E., of Shepherd's Bush; and MILES, G. H., and SMITH, C. C., both of Twickenham.

No. 5849; March 7, 1924.

This invention relates to coin-change mechanism for coin-freed meters. The latter are of various designs, and the object is to provide a construction by which, while the change-giving mechanism is of one particular form or construction, this mechanism can be easily and cheaply applied and used in different makes of meter.

This is accomplished under the present invention by employing a short tube, separate from the tube into which the prepayment

coins pass, and from which they are adapted to be withdrawn; and between the latter tube and the part in which the freeing coins are introduced, such short tube has mounted upon it and carries a lever or stop mechanism by which, when the coin tube contains a certain number of coins, the freeing coin receiving and introducing part is closed, or no more coins can be inserted. This short tube or duct, into the mouth of which the coins will be delivered, will be suitably fixed in the meter case and made of such a form as to constitute a connecting conduit or tube between the coin-receiving part —no matter where it is placed—and the upper end of the coin collecting tube proper of the withdrawing mechanism.

## APPLICATIONS FOR PATENTS.

**[Extracted from the "Official Journal" for Dec. 17.]**

Nos. 29,361 to 30,051.

COOPER, C.—"Manufacture of fuel gases." No. 29,826.
DOLPHIN, J.—"Valves for regulating passage of gas." No. 29,507.
DUNSTAN, A. E.—"Utilization of gas." No. 29,598.
FINLAYSON, T. C.—"Removal of sulphuretted hydrogen from gas." No. 29,732.
GLOVER & CO., LTD., G.—"Coin-freed mechanism." No. 29,724.
HELPS, G.—"Gas fires, gas burners, &c." No. 29,962.
HENSHAW, D. M.—See Cooper, C. No. 29,826.
HOLMES & CO., LTD., W. C.—See Cooper, C. 29,826.
HOLT, J.—"Gas-fires, &c." No. 29,609.
HOWLETT & CO., LTD., M.—See Dolphin, J. No. 29,507.
JOUAN, L.—"Means of illumination." No. 29,470.
PITKETHLEY, R.—See Dunstan, A. E. No. 29,598.
SMITH, E. W.—See Finlayson, T. C. No. 29,732.
SMITH, T. A.—See Dunstan, A. E. No. 29,598.
WALTER, C. M.—"Furnaces." No. 29,624.
WOODALL-DUCKHAM (1920), LTD.—See Finlayson, T. C. No. 29,732.
YATES, H. J.—See Dolphin, J. No. 29,507.

# PARLIAMENTARY INTELLIGENCE.

## HOUSE OF LORDS.

### Public Utility Companies (Capital Issues) Act, 1920.

Copies were presented of reports by the Board of Trade under the Act on applications by the St. Ives (Hunts.) Gas Company, Ltd., Solihull Gas Company, Wells Gaslight Company, and the Winchester Water and Gas Company.

### Denchar v. The Gas Light and Coke Company.

In this case [see the issues of the "JOURNAL" for Jan. 23, p. 210, May 28, p. 611, and June 25, p. 911] an appeal has been lodged in the House of Lords.

## HOUSE OF COMMONS.

### Gas Regulation Act.

Copies were presented to both Houses of drafts of Special Orders proposed to be made by the Board of Trade under section 10 of the Act, on the applications of the Barry Urban District Council, Castleford and Whitwood Gaslight and Coke Company, Deal and Walmer Gas and Electricity Company, Halesowen Gas Company, Helston Corporation, Liverpool Gas Company, and the Hightown Gas and Electricity Company, Redhill Gas Company, Ellesmere Port and Whitby Urban District Council, Morecambe Corporation, Mossley Corporation, Gosport Gas and Coke Company, Maryport Urban District Council, Newcastle-upon-Tyne and Gateshead Gas Company, Aldershot Gas, Water, and District Lighting Company, and the Skegness Urban District Council. Subsequently the drafts were approved, with the exception of the applications of the Deal and Walmer Gas and Electricity Company and the Skegness Urban District Council.

### Inspection of Gas Appliances.

On Tuesday, Dec. 16, Sir CLEMENT KINLOCH-COOKE asked the President of the Board of Trade if he would introduce legislation for the purpose of securing the efficient inspection and renovation of the gas piping, fittings, and appliances on consumers' premises, and the prohibition of the supply and use of unsound types of fittings, of flueless heaters liable to evolve carbon monoxide, and of geysers, &c., without proper ventilation.

Sir P. CUNLIFFE-LISTER replied that he did not at present contemplate legislation on this subject. He was fully aware of its importance, and the Board of Trade were taking steps which they hoped would result in the active co-operation of the gas industry and the makers of appliances in securing the objects indicated.

Sir C. KINLOCH-COOKE: Can the right hon. gentleman say when we shall know the result of this action by the Board of Trade?

Sir P. CUNLIFFE-LISTER: I hope shortly. It is going on very satisfactorily.

Mr. CLARRY: Is it not the fact that the undertakers will look after this matter in their own interests?

Sir P. CUNLIFFE-COOKE: I should like to stimulate both parties.

**Northfleet Gas Debentures.**—For the £6600 of 6 p.ct. redeemable mortgage debentures which Messrs. A. & W. Richards offered for the Northfleet and Greenhithe Gas Company, the tenders sent in amounted to £14,900, ranging from £102 down to the minimum of par. The average price obtained was £100 12s. 5d. p.ct.

# MISCELLANEOUS NEWS.

## GAS REGULATION ACT APPLICATIONS.

There have appeared in the "London Gazette" the following further notices regarding applications to the Board of Trade under the Gas Regulation Act.

### SPECIAL ORDERS.

**Preston Gas Company.**

Application is to be made by the Company for a Special Order to sanction and confirm the purchase by them of scheduled lands for gas purposes, and to make provisions with regard to finance and to the supply of gas.

**Slough Gas and Coke Company.**

The Company intend to apply for an Order under section 10 of the Act, to authorize the use of scheduled land for gas purposes, the raising of further capital, the continuation of the existing profit-sharing and co-partnership scheme, and to make provisions regarding the supply of gas.

### DECLARATION OF CALORIFIC VALUE.

**Mossley Corporation.**—500 B.Th.U. (Jan. 1.)

## TRADE NOTES.

**Drake Folders.**

Month by month throughout 1924 Messrs. Drakes, Ltd., of Halifax, have issued illustrated folders relating to various specialities in gas manufacturing plant. These have been prepared in a very attractive and a useful form; and as the firm believe there are many engineers who would like to have them in a compact style for reference, they are arranging to have available at the end of the year complete sets of the folders in a portfolio.

## CONTRACTS OPEN.

**Resetting Retorts, &c.**

The Clacton Urban District Council are inviting tenders for the supply of all materials and labour required for resetting two beds of seven retorts at their gas-works. [See advert. on p. 858.]

**Erection of Steel Storage Tanks.**

The Gas Department of the County Borough of Stoke-on-Trent are inviting tenders for the erection of three steel tar and liquor storage tanks at their Etruria Gas-Works. [See advert. on p. 858.]

**Carbonizing and Other Plant, Engine and Exhauster, Holder Extension, &c.**

Tenders are being invited by the Gas Committee of the Thornton District Council for the supply and erection of a retort house and coal store, underground tar and liquor well, adding lift to existing gasholder, tar distilling plant, steam engine and exhauster, buildings, &c. [See advert. on p. 858.]

### EXTENSIONS.

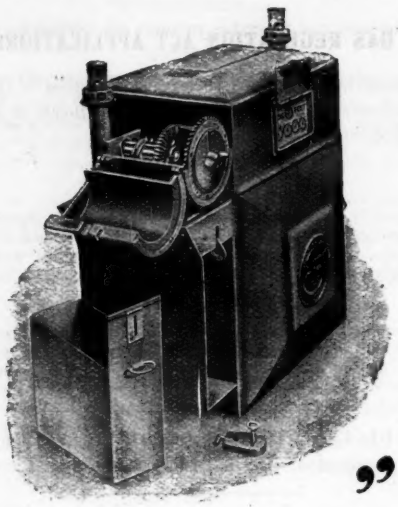
**Darlington Purifying Plant.**

The Darlington Corporation Gas Committee have decided to carry out considerable extensions. The scheme provides for an increase in the purifying plant, at an approximate cost of £15,000. This is in order to meet growing demands. Tenders are to be asked for at an early date.

## Gas Explosion in an Underground Chamber.

At about 9 a.m. on Wednesday last, reports were received by the Gas Light and Coke Company of gas escaping into the basements of many of the buildings in Great Tower Street, E.C. By 11.30 a.m. the escape had been located as coming from the 6-in. main in Great Tower Street by St. Dunstan's Hill. The officials of the Distribution Department were congratulating themselves on having got to the root of the matter, when a spark struck from a pick fired the gas in the ground. While endeavours were being made to extinguish the flames, an explosion occurred in an underground chamber belonging to the Charing Cross Electric Supply Company, within a few yards of the ground opening. The manhole cover was lifted, and several square yards of paving with it. Eleven people were injured by the flying woodblocks and débris, but fortunately no one was really seriously hurt. By 2.30 p.m. the source of the escape was found to be a break in the 6-in. main near where it rested on a concrete pier, which had probably been built-up from the crown of the tunnel of the District Railway when it was constructed many years ago. The fracture was undoubtedly caused by subsidence of the "made-up" sub-soil of the road.

**Gas Matters at Sidmouth.**—At the December meeting of the Sidmouth Urban District Council, Mr. Halse said the gas undertaking showed a clear profit of £407, after meeting interest charges of £2333 and repayment of loan £1703. It was agreed to reduce the price of gas from 6s. to 5s. 8d. per 1000 c.ft. The Council have paid £11,800 off their loans, and the amount outstanding is £54,000.



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## NORTH-EAST COAST COAL TRADE.

**From our Own Correspondent.**

The market has, towards the end of the week, become quieter under holiday influences. Trade continued brisk at the beginning, with a firm tone, while buyers were covering their requirements for the remainder of the year. As usual, there is likely to be little doing during Christmas and New Year weeks.

Durham coals have remained steady at about recent prices, but buying has still been very largely of the hand-to-mouth variety; little being heard of contracts for next year, except for a few Scandinavian railway orders for small quantities. Accounts still reach the market of contracts for next year for large quantities of German coal at prices with which we cannot hope to compete.

Gas coals have been strong and in good demand. Best qualities (Holmside or similar) are firmly quoted at 21s. 6d. f.o.b., and Wear Specials at 22s. to 22s. 6d. Other sorts are 18s. 3d. to 18s. 9d. Durham unscreened bunkers are in active demand, and prices are 18s. 6d. to 20s., according to quality. Unscreened coking sorts are 18s. 6d. to 19s.

## COAL TRADE IN THE MIDLANDS.

**From our Local Correspondent.**

Production has been at a standstill during Christmas week, and though it is understood that there will be a resumption on Monday some days will elapse before work is in full swing again. What with absenteeism and the clearing up that will have to be done, a week's output will be lost at most of the pits. In the prevailing conditions this will involve no serious inconvenience to the market as a whole. All the vulnerable points are well safeguarded with stocks.

There is a temporary tightening up in regard to slacks and beans, owing to supplies being reserved at the collieries for re-starting plants and to purchases by industrial consumers with the same object in view. Prices have been unaffected, however. Except for the yard trade, the domestic demand has drooped in a way which is very unusual at this season of the year. As a consequence of the mild weather, the stocks laid by in the summer have lasted longer than was anticipated. The outlook for the New Year is perplexed. Uneasiness is caused by the failure to recover economic equilibrium in the industry, and though high hopes are entertained of a brisker industrial demand at home, there are other factors which make the prospects of the less favourably circumstanced pits anything but reassuring.

## YORKSHIRE AND LANCASHIRE COAL TRADE.

**From our Local Correspondent.**

There are no new inquiries for gas coal in the open market in Yorkshire and Lancashire; but many of the works are now taking up their due proportion of contract quantities.

The approach of the holidays has not made much apparent difference to the coal trade; the continuance of mild weather having seemingly lulled the consumers of household fuel into a sense of security. The majority of collieries have small accumulated stocks.

There is no change in the industrial outlook, although various rumours are that, with the turn of the year, there is likely to be a reaction on a somewhat modified scale. Inquiries among the consumers lead to the belief that this is to a great extent due to anticipation, although in one or two instances new furnaces are likely to be started during January. The West Riding clothing trade, however, continues dull.

In Lancashire there is only a little more business stirring; but with the opening of business next year it is expected that industrial coal will sell more freely.

Exporters report a much better demand for washed nuts; but it is doubtful if this is increased trade or whether it is due to buyers having to fulfil their obligations under a contract before Dec. 31. As a consequence, prices have advanced sharply for this commodity. Hards and other descriptions of fuel usually exported remain sluggish. Gas coke is on the decline, and furnace coke retains a normal level.

Prices at Hull at the week-end were: Bunkers—Yorkshire, Derby and Notts., large screened steam, f.o.b. Humber ports, 17s. 6d. to 20s. For export, f.o.b. usual shipping ports—Best Yorks. hards, Association, 22s. 7½d. to 23s.; Derby best hards, 22s. 6d. to 23s. 3d.; West Yorkshire Hartleys, 18s. 6d. to 22s.; South Yorkshire washed doubles, 22s. 6d. to 23s.; South Yorkshire washed singles, 21s. to 21s. 6d.; dry doubles, 15s. 6d. to 16s. 6d.; South Yorks. washed smalls, 16s. 9d. to 17s.; Derby slack, 1 inch, 11s. 6d.; South Yorkshire rough slack, 11s. 6d. to 12s.; gas coke, 24s. to 31s. 6d.; foundry furnace coke, 23s. to 23s. 3d.; washed smithy peas, 24s. 6d. to 26s.; washed steam thirds, 20s. 6d.; South Yorkshire washed trebles, 23s. to 23s. 6d. per ton. Prices are unchanged at the Lancashire collieries.

**An Irish Gas Company's Affairs.**—In the Free State High Court, Dublin, a motion came on for the compulsory winding-up of the Parsonstown Gas Company, King's County. The motion was raised on the petition of Messrs. Wallace, coal merchants, of Dublin, who were creditors to the amount of £75, and who said that it was only by compulsory winding-up that the interests of creditors could be properly protected. The Liquidator of the Company filed an affidavit to the effect that everything had been done to ensure that all the interests concerned would be protected. Counsel for the creditors mentioned that a settlement had now been arrived at, and that the petition would not be proceeded with. It was therefore dismissed.

## CURRENT SALES OF GAS PRODUCTS.

### The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Dec.* 20.

Pitch is without material change, and the price is steady at from 52s. 6d. to 55s. per ton. The market, however, is quiet, and will probably remain so until after the holiday.

Creosote is firm at about 6½d. per gallon, with a fair amount of inquiry.

Pure benzole is in short supply at about 1s. 10d. to 2s. per gallon. Pure toluole is steady at about the same figure. Solvent naphtha, 95-160, is about 1s. 8d. per gallon.

### Tar Products in the Provinces.

*Dec.* 20.

The market for tar products remained steady throughout the past week.

In pitch little business is reported, and we do not expect to see any movement now until after the holidays.

Creosote is very firm, and improved prices have been paid.

Benzole and solvent naphtha are very firm.

For carbolic there is practically no inquiry.

The average values for gas-works products during last week were: Gas-works coal tar, 32s. 6d. to 37s. 6d. Pitch, East Coast, 50s. to 52s. 6d. f.o.b. West Coast—Manchester, 46s. 6d. to 47s. 6d.; Liverpool, 48s. to 49s.; Clyde, 50s. to 51s. Benzole, 90 p.ct., North 1s. 4d. to 1s. 5d.; crude 65 p.ct. at 120° C., 9½d. to 10½d. naked at makers' works; 50-90 p.ct. naked, North, 1s. 2d. to 1s. 3d. Toluole, naked, North, 1s. 4d. to 1s. 5d., nominal. Coal for crude naphtha in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 1s. 4d. to 1s. 6d. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, liquid, 5⅝d. to 5¾d.; salty, 5¼d. to 5⅜d.; Scotland, 5⅝d. to 5¾d. Heavy oils, in bulk, North, 6¾d. to 7d. Carbolic acid, 60 p.ct., 1s. 7d. to 1s. 8d. prompt. Naphthalene, £13 to £15; salts, £4 to £7, bags included. Anthracene, "A" quality, 3½d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

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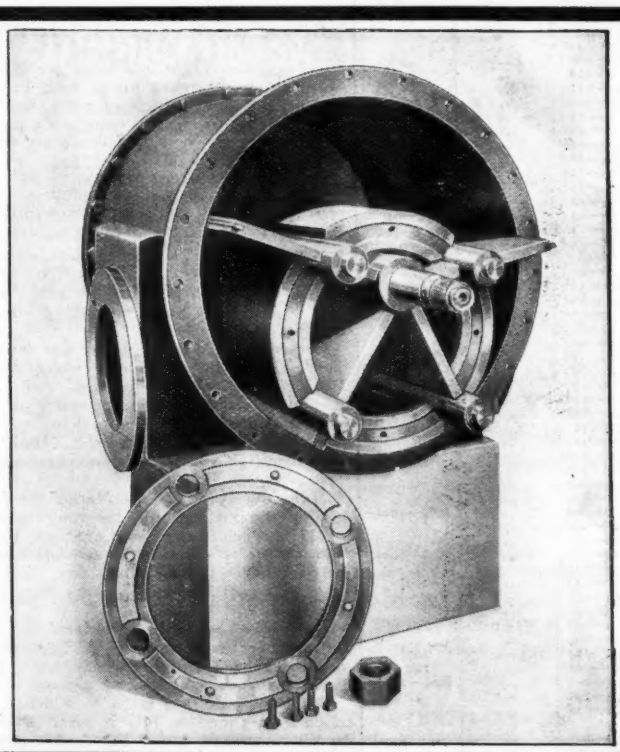
**Glasgow and the Mearns Gas Company.**—With reference to a remit to the Town Clerk to arrange a provisional agreement with the Mearns Gas Light Company, Ltd., for the sale to the Corporation of the gas-works, plant, mains, and meters belonging to the Company, the Town Clerk has submitted to the Corporation a draft of the agreement for the transfer of the Company's undertakings to the Corporation for the sum of £2250. This was approved by the Corporation.

**Weston-super-Mare Capital Issue.**—The tenders for the £15,000 of 6 p.ct. redeemable preference stock which Messrs. A. & W. Richards offered on behalf of the Directors of the Weston-super-Mare Gas Light Company amounted to over £66,000, and ranged from £103 15s. down to the minimum of par. The lowest successful tender was at £101 p.ct., and the average price obtained for the issue was £101 18s. 4d. p.ct.

**Hoylake Gas and Water Transfer.**—A meeting of shareholders of the Hoylake and West Kirby Gas and Water Company has been held in Liverpool, under the chairmanship of Mr. Alfred Tyrer, to consider a proposal for the sale of the Company's business to the Urban District Council. After the terms provisionally agreed to had been explained, a resolution was passed sanctioning the proposed transfer. It is expected that very shortly the scheme will be submitted to a meeting of the ratepayers of the urban district, and if approved by them it will be included in the Bill which has already been deposited.

**Gas Cooker Demand at Accrington.**—Acknowledging his election, for the 21st year, as Chairman of the Accrington and District Gas Board, Alderman D. C. Dewhurst stated that he had been informed by Mr. A. J. Harrison (the General Manager) that orders for cookers were being received faster than they could be supplied. Alderman Rawson inquired if they were to understand that the large number of cookers ordered was the outcome of the successful gas exhibition recently held, or was it due to the wonderful window displays at the showroom in St. James' Street? The displays made there had been most ingenious, and were a very great attraction, to say nothing of the brilliant gas lighting outside in the street. The General Manager thought the exhibition and the showroom combined had helped towards the increase recorded. Alderman Rawson said Mr. Harrison ought to be complimented upon the ingenuity he was displaying in this direction. Mr. Harrison: And the staff.

**Lighting and Accident Prevention.**—In a new accident prevention pamphlet issued by the National "Safety First" Association, of No. 119, Victoria Street, Westminster, S.W., it is pointed out that the lighting of factories is an important factor. The large number of fires due to faulty lighting arrangements is remarkable; the danger being intensified in the case of gas by careless methods used for lighting-up, and in the case of electricity by faulty wiring. One cause of accidents that is seldom appreciated is that of insufficient lighting. The following are among the recommendations made: Light your premises efficiently. Do not let there be any dark corners. Authorize a responsible man to light-up and to look after the installation. Use automatic lighters for gas, protect inflammable ceilings over gas burners and combustible material in the neighbourhood of swinging gas brackets. Do not place electric bulbs in contact with inflammable materials. Give instructions for the maintenance of these safeguards.



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# STOCK MARKET REPORT.

THE new issues of last week can hardly be described as successes. It was not surprising that the 4½ p.ct. Port of London Loan, which is not a Trustee Stock, but issued on terms equal to if not below such securities, was coldly received, and nearly 60 p.ct. was left with the underwriters. Applications for the Armstrong Whitworth Loan received allotments in full, and the "stags" were caught and had to unload at from ¼ to ½ discount. The issue of the Victoria 4½ p.ct. Loan at 97½ had an unsettling effect on the gilt-edged market. The successful Greek Loan justified expectations, and the price fluctuated between 7⅛ and 5¼ premium.

The Industrial Market was very active. In the Textiles, Courtaulds were most prominent, though they eased towards the close of the week and were quoted at 68s. 3d. on profit-taking. The increased dividend announcement of the British American Tobacco brought about further activity in the kindred issues. Newspapers also further improved.

There continued to be more buyers than sellers in the Gas Market. There has, however, been a reaction in the Brentford stocks transactions; the high price—118—touched for both stocks a fortnight ago has not been repeated, and business was done at 114. It will be noticed that the Oriental stock jumped 3 points on the week. Business was done in the Commercial 4 p.ct. stock, which has been exceptionally low in price for some months, at 95½, and this price more fairly represents the value. South Shields advanced 3 points, to 137-139, at Newcastle.

The following transactions were recorded during the week:

On Monday, Alliance and Dublin 65, British 118, Cape Town 4½ p.ct. preference 6½, 6½, 4½ p.ct. debenture 74, 74½, European 8 1/16, Gas Light and Coke 95, 95¼, 95¼, 95½, 95⅝, 96, 3½ p.ct. maximum 63¾, 64, 4 p.ct. preference 80, 3 p.ct. debenture 62, 62¼, Imperial Continental 177, Primitiva 8s. 10½d., South Metropolitan 100¼, 100⅜, 100½, 100⅝, 101, 101½, South Suburban 5 p.ct. debenture 98¼, 99, Tottenham "B" 103, 103⅜, Tuscan 24s. 10½d. Supplementary prices, Barnet "A" 148, "C" 148½, "D" Water 107½, Croydon 7½ p.ct. preference 104.

On Tuesday, British 116½, 7 p.ct. preference 126½, Commercial 4 p.ct. 94½, Gas Light and Coke 95⅛, 95¼, 95⅜, 4 p.ct. preference 81, 3 p.ct. debenture 62¼, Imperial Continental 177½, 178, 178½, 179, Montevideo 63, 64, Plymouth and Stonehouse 115, Primitiva 8s. 7½d., 8s. 9d., 4 p.ct. debenture 77½ *ex* div., South Metropolitan 100¼, 101, 6½ p.ct. debenture 104½, Swansea 6½ p.ct. debenture 105¾, Tottenham "A" 120, "B" 102½. Supplementary prices, Barnet "A" 149, "C" 149, "D" Water 108, Hornsey 5 p.ct. preference 94½, 4 p.ct. debenture 75½, Southgate 4 p.ct. debenture 74½.

On Wednesday, Alliance and Dublin 65, Brentford "B" 114, Cape Town 4½ p.ct. debenture 75½, Commercial 4 p.ct. 95¼, Continental Union 37, Gas Light and Coke 95⅛, 95¼, 95⅜, 95⅝, 4 p.ct. preference 80, 3 p.ct. debenture 62, Imperial Continental 177½, Primitiva 8s. 6d., 8s. 9d., South Metropolitan 101, 6½ p.ct. debenture 105½, South Suburban 5 p.ct. 109½, Tottenham "B" 103½, Tuscan (Nos. 1 to 18,238) 30s.

On Thursday, Bournemouth 13, 13⅛, 13¼, "B" 12⅛, 12⅞, Brentford "A" 114, Brighton and Hove 173, "A" 126, Bristol 5 p.ct. maximum 95¼, Gas Light and Coke 95, 95¼, 95⅜, 95⅞, 3 p.ct. debenture 61 *ex* div., Primitiva 8s. 9d., 4 p.ct. debenture 1911 61½, 62, South Metropolitan 101, South Suburban 5 p.ct. debenture 97 *ex* div. Supplementary prices, Reading 5 p.ct. maximum 82, 82½.

On Friday, Alliance and Dublin 66, Commercial 3 p.ct. debenture 57½ *ex* div., East Hull 5 p.ct. maximum 87½, Gas Light and Coke 95, 95⅛, 95¼, 95⅜, 3½ p.ct. maximum 64, 4 p.ct. preference 80, Imperial Continental, 179, Montevideo 64, Oriental 101, 102, Primitiva 8s. 9d., South Metropolitan 100½, Tottenham "A" 120. Supplementary prices, Oxford 5 p.ct. preference 95.

In the Money Market interest was centred in the Treasury Bill allotment, which brought about a sharp rise in discount rates. The average rate realized was £3 15s. 5·3d. p.ct., or just under 2s. p.ct. more than last week and the highest rate since Sept. 5. Money was more plentiful, and 2⅜ p.ct. was obtainable for fresh advances.

In the Foreign Exchange Market the dollar-sterling showed strength, the rate closing at 4·70 1/16. French francs closed at 87.30. Belgian francs at 94.55. Italian lire finished lower at 109.85. The Indian rupee was higher at 1s. 6 7/16 d., and Argentine dollars were easier at 45 1/16.

The price of bar silver depreciated materially during the week, and closed at 32 1/16d. per oz. for cash. Gold was fairly steady, but was 2d. down on the week at 88s. 7d. per oz.

The Bank rate is 4 p.ct., to which it was raised from 3 p.ct. on July 5, 1923. Bankers' deposit rates are 2 p.ct. The deposit rates of the discount houses are 2 p.ct. at call and 2¼ p.ct. at notice.

| Issue. | Share. | When ex-Dividend. | Dividends. Prev. Hf.Yr. | Dividends. Last Hf. Yr. | NAME. | Quotations. Dec. 19. | Rise + or Fall − on Week. | Transactions Lowest and Highest Prices. |
|---|---|---|---|---|---|---|---|---|
| £ | | | % p.a. | % p.a. | | | | |
| 171,978 | Stk. | Aug. 14 | 5 | 5 | Aldershot 5 p.c. max. C. | 80—83 | .. | .. |
| 235,492 | ,, | ,, | 4 | 4 | Do. 4 p.c. Pref. | 72—77 | .. | .. |
| 1,551,868 | ,, | Sept. 25 | 6 | 6½ | Alliance & Dublin Ord. | 64—69 | .. | 65—66 |
| 374,000 | ,, | July 10 | 4 | 4 | Do. 4 p.c. Deb. | 63—68 | .. | .. |
| 300,000 | 5 | Oct. 23 | 8 | 8 | Bombay, Ltd. | 5—5½ | .. | .. |
| 100,000 | 10 | Aug. 14 | 8½ | 8½ | Bournemouth 5 p.c. | 12½—13½ | .. | 13—13½ |
| 425,050 | 10 | ,, | 7 | 7 | Do. B 7 p.c.. | 12½—13 | .. | 12½—12⅝ |
| 150,000 | 10 | ,, | 6 | 6 | Do. Pref. 6 p.c.. | 10⅝—11⅝ | .. | .. |
| 50,000 | Stk. | June 26 | 3 | 3 | Do. 3 p.c. Deb.. | 57—60 | .. | .. |
| 162,025 | ,, | ,, | 4 | 4 | Do. 4 p.c. Deb.. | 77—80 | .. | .. |
| 992,043 | ,, | July 10 | 6 3/10 | 6 3/10 | Brentford A Con. | 114—119 | .. | 114 |
| 990,500 | ,, | ,, | 6⅝ | 6⅝ | Do. B New | 114—119 | .. | 114 |
| 76,000 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. | 89—94 | .. | .. |
| 306,690 | ,, | Dec. 18 | 4 | 4 | Do. 4 p.c. Deb. | 75—80* | .. | .. |
| 181,337 | ,, | ,, | — | 6 | Do. 6 p.c. Rich. Red. Deb. | 98—103* | −2 | .. |
| 214,740 | ,, | Aug. 28 | 11½ | 11½ | Brighton & Hove Orig. | 170—175 | .. | 173 |
| 244,200 | ,, | ,, | 8½ | 8½ | Do. A Ord. | 124—128 | .. | 126 |
| 1,287,500 | ,, | July 24 | 5 | 5 | Bristol 5 p.c. max. | 92½—93¼a | .. | 95⅛ |
| 855,000 | ,, | Sept. 25 | 7 | 8 | British Ord. | 115—120 | .. | 116½—118 |
| 100,000 | ,, | Dec. 18 | 7 | 7 | Do. 7 p.c. Pref. | 123—128* | −2 | 126½ |
| 120,000 | ,, | ,, | 4 | 4 | Do. 4 p.c. Red. Deb. | 72—77* | .. | .. |
| 100,000 | 10 | Dec. 18 | 8 | 6 | Cape Town, Ltd. | 6¼—7¼* | −⅛ | .. |
| 100,000 | 10 | Nov. 6 | 4½ | 4½ | Do. 4½ p.c. Pref. | 6—7 | .. | 6¼—6½ |
| 150,000 | Stk. | Dec. 18 | 4½ | 4½ | Do. 4½ p.c. Deb. | 71—76* | −1 | 74—75½ |
| 626,860 | ,, | July 24 | 6 | 6 | Cardiff Con. Ord. | 97—100 | .. | .. |
| 237,860 | ,, | June 26 | 7½ | 7½ | Do. 7½ p.c. Red. Deb. | 103—106 | .. | .. |
| 157,150 | ,, | Aug. 14 | 6½ | 5 | Chester 5 p.c. Ord. | 86—91b | .. | .. |
| 1,513,280 | ,, | July 24 | 6 | 6 | Commercial 4 p.c. Cap. | 94—97 | .. | 94½—95½ |
| 360,000 | ,, | ,, | 6 | 6 | Do. 3½ p.c. Cap. | 91—97 | .. | .. |
| 475,000 | ,, | Dec. 18 | 3 | 3 | Do. 3 p.c. Deb. | 57—60* | −1 | 57½ |
| 800,000 | ,, | 14 Jan. 15 | — | — | Continental Union, Ltd. | 35—40 | .. | 37 |
| 200,000 | ,, | Dec. 18 | 7 | 7 | Do. 7 p.c. Pref. | 86—91* | −3 | .. |
| 660,000 | ,, | Aug. 28 | 6½ | 6½ | Croydon sliding scale | 102—105 | .. | .. |
| 284,975 | ,, | ,, | 5 | 5 | Do. max. div. | 84—87 | .. | .. |
| 492,270 | ,, | Aug. 28 | 9 | 6 | Derby Con. | 107—110c | .. | .. |
| 55,000 | ,, | July 10 | 4 | 4 | Do. Deb. | 74—76c | .. | .. |
| 1,002,180 | 10 | July 24 | 8 | 6 | European, Ltd. | 8—9 | .. | 8 1/16 |
| 16,303,045 | Stk. | Aug. 14 | 5½ | 5½ | Gas Light & Coke 4 p.c. Ord. | 94½—96½ | .. | 95—96 |
| 2,600,000 | ,, | ,, | 3½ | 3½ | Do. 3½ p.c. max. | 61—64 | .. | 63½—64 |
| 4,062,235 | ,, | ,, | 4 | 4 | Do. 4 p.c. Con. Pref. | 79—81 | .. | 80—81 |
| 4,761,930 | ,, | Dec. 18 | 3 | 3 | Do. 3 p.c. Con. Deb. | 59—62* | −1 | 61—62½ |
| 139,000 | ,, | — | 10 | 10 | Do. 10 p.c. Bonds | .. | .. | .. |
| 42,000 | ,, | — | 7½ | 7½ | Do. 7½ p.c. Ilford Deb. | .. | .. | .. |
| 82,500 | ,, | Sept. 11 | 6½ | 6½ | Hastings & St. L. 5 p.c. Conv. | 95—100 | .. | .. |
| 258,740 | ,, | ,, | 5½ | 5½ | Do. 3½ p.c. Conv. | 73—80 | .. | .. |
| 70,000 | 10 | Sept. 25 | 10 | 10 | Hongkong & China, Ltd. | 16—17 | .. | .. |
| 86,600 | Stk. | Aug. 14 | 10 | 10 | Hornsey 7 p.c. | 138—143 | .. | .. |
| 1,976,000 | ,, | Nov. 20 | 30 | 10 | Imperial Continental Cap. | 175—180 | .. | 177—179 |
| 263,950 | ,, | Aug. 14 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. | 70—73 | .. | .. |
| 235,242 | ,, | Aug. 14 | 6½ | 6½ | Lea Bridge 5 p.c. Ord. | 97—102 | .. | .. |
| 2,127,340 | ,, | Aug. 14 | 5½ | 5½ | Liverpool 5 p.c. Ord. | 91½—91⅞b | .. | .. |
| 600,000 | ,, | Sept. 25 | 7 | 7 | Do. 7 p.c. Red. Pref. | 104—107b | .. | .. |
| 165,736 | ,, | Aug. 28 | 8 | 9 | Maidstone 5 p.c. Cap. | 125—135 | .. | .. |
| 63,480 | ,, | Dec. 18 | 3 | 3 | Do. 3 p.c. Deb. | 54—59* | −1 | .. |
| 75,000 | 5 | Dec. 4 | 7 | 5 | Malta & Mediterranean | 3½—3⅝ | .. | .. |
| 341,920 | Stk. | Nov. 20 | 4 | 4 | Montevideo, Ltd. | 60—65 | .. | 63—64 |
| 1,875,892 | ,, | July 24 | 5½ | 5 | Newcastle & Gateshead Con. | 84—84½d | +½ | .. |
| 250,166 | ,, | ,, | 4 | 4 | Do. 4 p.c. Pref. | 74—75d | .. | .. |
| 529,705 | ,, | Dec. 18 | 3½ | 3½ | Do. 3½ p.c. Deb. | 68—69*d | −½ | .. |
| 15,000 | 10 | Aug. 28 | 11 | 11 | North Middlesex 10 p.c. | 16—17 | .. | .. |
| 75,940 | 10 | ,, | 7 7/16 | 7 7/16 | Do. 7 p.c. | 11¼—11⅝ | .. | .. |
| 300,000 | Stk. | Dec. 4 | 7 | 9 | Oriental, Ltd. | 100—105 | +3 | 101—102 |
| 138,120 | ,, | June 26 | 7¼ | 7½ | Plym'th & Ston'house 5 p.c. | 112—117 | .. | 115 |
| 60,000 | 50 | Aug. 28 | 13 | 13 | Portsea Island B | 99—102 | .. | .. |
| 100,000 | 50 | ,, | 12 | 12 | Do. C | 95—100 | .. | .. |
| 2,289,909 | 1 | — | — | — | Primitiva Ord. | 8/6—9/6 | .. | 8/6—8/10½ |
| 311,100 | 100 | Dec. 1 | 4 | 4 | Do. 4 p.c. Red. Deb. | 76—79 | .. | 77½ |
| 600,000 | Stk. | July 24 | 4 | 4 | Do. 4 p.c. Red. Deb. 1911 | 61—63 | .. | 61½—62 |
| 220,335 | ,, | Dec. 18 | 4 | 4 | Do. B. Aires 4 p.c. Rd. Db. | 61—63* | .. | .. |
| 321,670 | ,, | ,, | 4 | 4 | Do. R'r P'te 4 p.c. Rd. Db. | 61—63* | .. | .. |
| 150,000 | 10 | Sept. 25 | 6 | 6 | San Paulo 6 p.c. Pref. | 7¼—7½ | .. | .. |
| 125,000 | 50 | July 1 | 5 | 5 | Do. 5 p.c. Red. Deb. | 42—44 | .. | .. |
| 270,000 | Stk. | Aug. 28 | 5/8/4 | 5½ | Sheffield A | 104—106e | +1 | .. |
| 419,968 | ,, | ,, | 5/8/4 | 5½ | Do. B | 104—106e | +1 | .. |
| 1,047,000 | ,, | ,, | 5/8/4 | 5½ | Do. C | 104—106e | +1 | .. |
| 90,000 | 10 | Oct. 23 | 8 | 6 | South African | 7—9 | .. | .. |
| 6,609,895 | Stk. | Aug. 14 | 6½ | 5 | South Met. Ord. | 100—102 | .. | 100½—101½ |
| 102,580 | ,, | July 10 | 5 | 5 | Do. Red Pref. | 98—100 | .. | .. |
| 1,895,445 | ,, | ,, | 3 | 3 | Do. 3 p.c. Deb. | 60—63 | .. | .. |
| 734,000 | ,, | Sept. 11 | 6½ | 6½ | Do. 6½ p.c. Red. Deb. | 104—106 | .. | 104½—105½ |
| 91,500 | ,, | Aug. 28 | 8½ | 8½ | South Shields Con. | 137—139d | +3 | .. |
| 2,087,795 | ,, | Aug. 14 | 6½ | 6½ | South Suburban Ord. 5 p.c. | 107—112 | .. | 109½ |
| 368,837 | ,, | Dec. 18 | 5 | 5 | Do. 5 p.c. Deb. | 94—99* | −1 | 97—99 |
| 647,740 | ,, | Nov. 6 | 5 | 5 | South'mpt'n Ord. 5 p.c. max. | 83—86 | .. | .. |
| 121,275 | ,, | Dec. 18 | 4 | 4 | Do. 4 p.c. Deb. | 72—77* | −1 | .. |
| 250,000 | ,, | Aug. 28 | 7 | 7 | Swansea 7 p.c. Red. Pref. | 102—104 | .. | .. |
| 200,000 | ,, | Dec. 18 | 6½ | 6½ | Do. 6½ p.c. Red. Deb. | 102—104* | −2 | 103½ |
| 120,000 | ,, | July 24 | 8 | 8 | Tottenham District A 5 p.c. | 118—121 | .. | 120 |
| 882,275 | ,, | ,, | 6½ | 6½ | Do. B 3½ p.c. | 102—105 | .. | 102½—103½ |
| 181,255 | ,, | Dec. 18 | 4 | 4 | Do. 4 p.c. Deb. | 75—79* | −1 | .. |
| 258,252 | ,, | Aug. 28 | 7/14/4 | 5 | Tynemouth Con. and New | 84—86d | .. | .. |
| 187,294 | ,, | Aug. 28 | 6½ | 6½ | Uxbridge, Maidenhead, & Wycombe 5 p.c. | 102—107 | .. | .. |
| 68,330 | ,, | Aug. 28 | — | 5 | Do. 5 p.c. pref. | 95—100 | .. | .. |
| 91,800 | ,, | — | — | — | Do. 5 p.c. Maidenh'd | 100—105 | .. | .. |
| | | | | | Wandsworth, Wimbledon, and Epsom— | | | |
| 30,000 | ,, | July 10 | 9½ | 9½ | Wandsworth A 5 p.c. | 140—145 | .. | .. |
| 255,636 | ,, | ,, | 7½ | 7½ | Do. B 3½ p.ct. | 120—125 | .. | .. |
| 108,075 | ,, | ,, | 6/7/9 | 6/9/6 | Do. C | 102—107 | .. | .. |
| 240,865 | ,, | ,, | 6/7/9 | 6/9/6 | New Ordinary | .. | .. | .. |
| 352,000 | ,, | ,, | 7½ | 7½ | Wimbledon 5 p.ct. | 116—121 | .. | .. |
| 98,000 | ,, | ,, | 7½ | 7½ | Epsom 5 p.ct. | 122—127 | .. | .. |
| 88,416 | ,, | Dec. 18 | 3 | 3 | 3 p.c. Deb. | 57—60* | −1 | .. |

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle. e.—Sheffield. * Ex. div.

**Gas Cooking and Heating in Manchester.**—The "Manchester Guardian" says that in 1904 17,722 gas cookers were in use in Manchester; in 1914 this number had grown to 72,993; and to-day the Manchester Gas Department have out 130,290. In addition there are now 46,598 gas fires and radiators used. The gas for these cookers and fires displaces 150,000 tons of coal, which would otherwise be burned in the raw state, and thus 8800 tons of soot are prevented from polluting the atmosphere every year. Householders have been steadily encouraged to use gas cookers. They have only to apply to the Gas Department in order to be supplied free of charge with a means of cooking that involves no pollution of the atmosphere. Gas cookers are both supplied and fixed free of charge by the Corporation. For gas fires a charge is made, ranging from 6s. to 12s. a year, according to size.

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Prizes won in a cookery competition held among schoolgirls, at the instance of the York Gas Company, were presented by the Lady Mayoress of York (Lady Newbald Kay).

New York State now has 88 manufactured gas companies, serving about 10,000,000 people, while there are in service in the homes of the State more than 3,000,000 gas stoves, heaters, and other domestic appliances.

The Hebden Bridge and Mytholmroyd Gas Board have written to the Halifax Corporation drawing attention to damage to parts of the gas main in Crossley Hill and New Road, believed to be due to defects in the Halifax electricity cable.

The Gas Committee of the Forfar Town Council have decided to apply to the Ministry of Transport for an unemployment grant in connection with the renewal of gas mains. They wish for a grant of 60 p.ct. of the wages paid in connection with the work.

The Gas Committee of the Walsall Town Council have agreed to reconsider their decision not to supply gas to Goscote. It was urged by the Committee that, as there would only be a few consumers, the extension of the mains would be an unprofitable proposition.

The Tynemouth Corporation have authorized the Housing Architect to endeavour to arrange, where feasible, for gas and water mains and electric cables to be laid between the backs of houses, a right-of-way to the rear in order to give access to such pipes and cables, or, as an alternative, for the mains and cables to be laid on both sides of the road.

The Weymouth Corporation have appointed a Committee to meet the Directors of the Gas Company to see whether it is possible to arrive at some basis under which an agreement can be made as to the price to be paid for freeholds and leaseholds which the Company wish to purchase for the extension of their premises at the gas-works.

Hele's School, Exeter, have been the recipients of a valuable gift from the Exeter Gas Company, in the form of a complete set, in show bottles, of the products of the distillation of coal in gas manufacture. The collection will prove of great use to the students of chemistry, and the cordial thanks of the Education Committee have been tendered to the Gas Company.

The Directors of Messrs. Gibbons (Dudley), Ltd., have declared the remaining 3½ p.ct. dividend upon the 7 p.ct. preference shares, and a second interim dividend of 3½ p.ct. upon the ordinary shares, both being payable free of income tax on Jan. 1. The payment of a further dividend on the ordinary shares will be considered by the Directors when the final results of the year's trading are known.

On Sunday, Dec. 14, a war memorial was unveiled at the works of Messrs. Stewarts and Lloyds, Ltd., at Coombs Wood, Halesowen, by Colonel G. W. Howard, son of Colonel Henry Howard, Vice-Chairman of the Company. It consists of a bronze tablet erected by the Company, at the entrance of the Works Hall, recording the names of the employees who were killed in the war.

At a meeting of the Wellington (Salop) Urban Council last week, a letter was read from the Wellington Gas Company asking the Council's sanction to the Company's application for permission to supply electric energy in the district. After a full discussion, and having regard to the developments in respect to electric power in the Midlands, it was decided that the permission asked for be not granted.

The Walsall Town Council at their last meeting discussed the question of the setting-up of a central office for dealing with the accounts of various departments of the Corporation, including the gas and electricity concerns. They decided that such an office should be arranged, and appointed as its chief Mr. Vaughan Mold (of the Treasurer's Department). The scheme met with some opposition, owing to the fact that the accounts will now have to be paid by the consumer at the central office.

The Weymouth Corporation have decided to borrow £8992 for gas plant.


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Sealed Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Gas Works Extensions," must be Delivered to the undersigned not later than the 19th of January, 1925.
The lowest or any Tender will not necessarily be accepted.

HENRY FENTON,
Gas Manager.

Council Offices,
Thornton-le-Fylde.
Dec. 20, 1924.

**CLACTON URBAN DISTRICT COUNCIL.**
(GAS AND WATER DEPARTMENT.)

**TENDERS are invited for the Supply** of all Materials and Labour required for RESETTING two Beds of Seven RETORTS at the Gas-Works, Clacton-on-Sea.
Specification and full Particulars may be obtained from Mr. Sydney Francis, A.M.I.Mech.E., Engineer and Manager, upon Application.
Tenders, in sealed packets, endorsed "Tender for Retorts," to be Delivered to the undersigned not later than Twelve o'clock noon on Wednesday, Jan. 7, 1924.

GEO. T. LEWIS,
Clerk to the Council.

Council Offices,
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Dec. 18, 1924.


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Gas Consolidation Act (1922).

CONTRACT No. 27.

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Persons desirous of Tendering are requested to make written Application to the Chief Gas Engineer, Gas-Works, Etruria, Stoke-on-Trent, not later than Thursday, 1st January, 1925, and to enclose Deposit of £1 Treasury Note, which will be returned on receipt of a *bona-fide* Tender, together with all Plans and Documents.
Sealed Tenders to be forwarded to the undersigned not later than Twelve noon on Saturday, 10th January, 1925, and endorsed "Tender for Steel Storage Tanks."

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By order,
WILLIAM LYLE GALBRAITH,
Secretary.

Chief Office,
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